THE
DIARY COMPANION;

BEING A

SUPPLEMENT

TO THE

LADIES' DIARY,

FOR THE YEAR 1795.

Containing Anſwers to the laſt Year's ENIGMAS, REBUSES, CHARADES, QUERIES, and QUESTIONS; both in the DIARY and SUPPLEMENT.

With ſome New ENIGMAS, REBUSES, CHARADES, QUERIES, and QUESTIONS, propoſed to be anſwered next Year.

Alſo, CALCULATIONS of the ECLIPSES; and other New Diſcoveries in the Heavens.

By the DIARY AUTHOR.

SUPPLEMENT
TO THE
LADIES' DIARY,
FOR THE YEAR 1795.

ANSWERS TO THE ENIGMAS.

1. Diary Enigmas.

1 Cheek,
2 Music,
3 Charade,
4 Ball,
5 Skewer,

6 Garter,
7 Tide,
8 Dew,
9 Cameleon,
10 Tear.

2. Supplement Enigmas.

1 Kiss,
2 Sleep,
3 Weather Cock,
4 Scythe,

5 Eye,
6 Books,
7 Frost.

Other Answers to the Diary Prize Enigma, beside those inserted in the Diary, are as below.

9. *Invocation to Peace; by Mr. J. Bayley, Middleton, Yorksh.*
Come, gentle Peace, from the wild floods of war,
Come, dove-like, and thy blooming olive bear.
Tell me, ye victors, what strange charms ye find
In conquest; that destruction of mankind.
Unenvy'd may your laurels ever grow,
That never flourish but in human woe,
If never earth the wreath triumphal bears,
Till drench'd in hero's blood, or orphans' TEARS.

10. *The Tear; by Mr. William Durnford.*
Oh! that the Chemist's magic art
Could crystallize this sacred treasure!
Long should it glitter near my heart,
A secret source of pensive pleasure.

The little brilliant, ere it fell,
Its lustre caught from Chloe's eye;
Then, trembling, left its coral cell—
The spring of sensibility!

Sweet drop of pure and pearly light!
In thee the rays of virtue shine
More calmly clear, more mildly bright
Than any gem that gilds the mine.

Benign restorer of the soul!
Who ever fly'st to bring relief,
When first she feels the rude controul
Of love or pity, joy or grief.

The Sage's and the Poet's theme,
In ev'ry clime, in ev'ry age;
Thou charm'st in fancy's idle dream,
In reason's philosophic page.

That very law * which moulds a TEAR,
And bids it trickle from its source,
That law preserves the earth a sphere,
And guides the planets in their course.
* *The law of gravitation.*

11. *The same, by Mr. John Fildes, Schoolmaster in Liverpool.*
When Adam, weary of his life,
Was sorely vex'd at Eve his wife;
If Milton tells us true, 'tis clear,
She soon appeas'd him with a *Tear.*

12. *Sonnet to Pity; by Hermes.*
Enchanting power! the muse delights to trace
The beam benignant, in thy downcast eye,
The roseate blush that glows upon thy face,
The heaving bosom and the pensive sigh.

Mov'd by thy gentle influence, see the maid,
A heighten'd charm, a softer grace acquire,
In her mild glance thy tender wish display'd,
The soul of sympathy and kind desire.

The brightest gem Golconda's mines can shew,
Thy stealing TEAR excells its lucid ray;
Not the loud bursts of mirth's transporting flow
Are half so pleasing as thy moving lay—

The gems and mirth's loud raptures I resign,
Be but thy moving lay, thy sweet effusions mine.

13. *False Sympathy; by Hilarius.*
That wars and massacres prevail,
Chloe without emotion hears;
But if her lap-dog singe his tail,
Her gentle heart dissolves in TEARS.

14. *True Sympathy; by Philo.*
While dying groans of wounded foes or friends,
With solemn sadness strike my list'ning ear;
While war into the grave its myriads sends,
Humanity demands the falling TEAR.

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15. *An Address to Eliza; by Mr. Jof. Scott, near Hefket-new-market, Cumberland.*

Why fighs fair Eliza unmarri'd in TEARS,
While I, who am fifty, and brifk at my years,
Have never been married, nor ever could get
My equal for riches, for perfon, and wit;
But fancy them all in you fully combin'd,
It fo ftrikes my heart, and to wed I'm inclin'd;
For I think as you do, and certain it is,
If you think as I do, a match cannot mifs.
But muft be done quickly, for I'm in full cue,
By you to be happy, and happy make you.
Yet hope that Eliza wil! frankly confefs,
If her thoufand be—real pounds Sterling—nothing lefs.

16. *The Caufes of Tears ; by Mifs Maria Stanhope.*

When children for fport twitch the hair from the head,
Or ill-natur'd taunts have imprudently fled;
When fhame and contrition have foften'd the heart,
Or flander been bufy to envenom her dart;
When puzzled in ftudy a tafk to obtain,
Or the rod of correction's inflicted in vain.
The deep grief it has fpoke that had long been conceal'd,
When friends faithlefs prov'd and fecrets reveal'd;
When effufions of fancy enliven the brain,
And the foul's tender fibres bound high from each vein;
When fome object that's abfent is call'd to the view,
Till loft in the maze it would fondly purfue,
When ftartled with fear or in vifions of dread,
Or elfe when the heels are too light for the head.
When brother or fifter, parent, lover or friend,
In the anguifh of parting, how apt to attend,
When the heart fympathetic its feelings difclofe,
Or when cruel adverfity's tide overflows;
When reflection's keen edge has a refidence found,
And friends with upbraidings imbitter the wound.
When fweet fenfibility bleeds at each pore,
And loaths an exiftence too hard to indure;
In each age, fex, condition, by turns is it feen,
When enrag'd, or when joyful, in both in extreme;
Thus its influence moft poignant is fure to difplay,
When the ftab of ingratitude marks its dread way
But from caufes contrary you'll find 'twill appear,
The effect is the fame, each producing a TEAR.

Other ANSWERS *to the* DIARY ENIGMAS, *beside those inserted in the Diary, are as follow.*

12. *Chloe; by Mr. I. Liddell, of Hovingham.*

When Chloe is with me, all cares I defy,
　Her graces with rapture I view ;
The bloom in her *Cheek* not the rose can outvie,　　1
　Nor shew such a beautiful hue.
No *Music* can equal the notes of her voice ;　　2
　How melodious it sounds in my ear :
In the *Ball* when she trips I am envy'd my choice,　4
　But can't be depriv'd of my dear.
Unaffectedly neat she always is seen,
　Not *Skewer*'d like a primming old maid ;　　5
Her wit's as engaging as graceful her mien,
　For quickly she forms the *Charade.*　　3
Not the *Tide* is more sure than Chloe is true ;　　7
　Delusion in her would be strange ;
With her love I'm refresh'd, as grass with the *Dew*,　8
　Nor *Cameleon*-like ever can change.　　9
Her breast heaves the sigh at the sight of distress,
　Her eyes shed the pitiful *Tear*,　　10
In vain she endeavours her grief to suppress,
　For her looks denote it too clear.—
Unrival'd by any, how bless'd is my fate,
　My Chloe's the sum of my care ;
The knight of the *Garter* may boast of his state,　6
　But can't of a charmer so fair.

13. *A Morning's Walk ; by Mr. Paul Measor, Pupil to the Rev. Mr. Mossop, Brighthelmstone.*

One morning while the *Dew* was seen,　　8
I tript it o'er to yonder green ;
Where the swift *Tide* glides fast along,　　7
And Philomela chaunts her song :
There in sweet peace calmly to rest,
Nor let dread fears disturb my breast.
Down in a cool recess I sat,
And with fair Dia was my chat,
In finding out her curious *riddles*,　　3
Of *Garter*s, *Skewer*s, *Ball*s, and *fiddle*s :　6, 5, 4, 2
*Cameleon*s too she sometimes hides,　　9
And *Cheek*s bedew'd with *Tear*s besides.　1, 10

14. *Choice of a Wife ; by Minor.*

Grant me, ye Gods, a wife of stature low ;
Her *Cheek*s like roses, and her neck like snow ;　　} 1
Her hair in ringlets down her back let flow :

" Her teeth like ivory, well fiz'd and even ;
" And to her breath, ethereal fweets be given :"
Her lovely eyes, like em'ralds bright fhould fhine ;
The *Mufic* of her tongue fhould be divine.   2
But above all, let her have fenfe and wit,
To guefs enigmas, or *Charades* to hit ;   3
Whether they're made on *Garter, Skew'r,* or *Tide* ; 6, 5, 7
Cameleon, Dew; or any thing befide.   9, 8
With fuch a wife, replete with all thefe graces,
I'd feek no other charms, in other faces.
With her fometimes I'd vifit play or *Ball*,   4
And reckon her, my pleafing all in all.
And if I fhould furvive this lovely fair ;
For her I'd ever fhed the tender *Tear*.   10

15. *The Garter ; by Mr. Jof. Scott, near Hefket-new-market.*
As Nancy to a *Ball* was bound,   4
Intent to hear the *Mufic* found,   2
Her fickle fwain her *Garter* found,   6
   And fent her a *Charade* on't.   3
This funk her in a *Tide* of fears,   7
That foon be*dew*'d her *Cheek*s with *Tear*s ; 8, 1, 10
She fear'd there would fome taunts and jeers,
   And idle things be faid on't.

She pinn'd her ftocking with a *Skewer*,   5
And thought, an ilb fhe could not cure,
'Twas beft with patience to endure :
   It prov'd fo in the fequel.
For as *Cameleon*s change their hue,   9
His heart did melt and mould anew ;
He prov'd thence-forward kind and true,
   And Hymen made them equal.

16. *The Sailor's Return ; by Mr. James Biggs Williams.*
When forc'd to leave my native fhore,
I lov'd a nymph, no mortal more.
On my return, I faw her fhed
A *Tear* that o'er her *Cheek*s was fpread.   10, 1
Her conftant heart had never veer'd,
Tho' *powder'd* beaux their fuit prefer'd.   5
No *tuneful* fop, no *Garter*'d rake,   2, 6
Could make dear Sue her *Tar* forfake,
Her *Dewy* lips I prefs'd, and fwore,   8
Fate never fhould divide us more ;
Tho' fortune like *Cameleon* change,   9
On ftormy feas no more to range ;
No more attend the *cannon*'s roar.   4
But blefs'd in love reft fafe on fhore ;
Like a *Charade* unite in one,   3
Till life's appointed *Tide* is run.   7

ANSWERS *to the* PRIZE ENIGMA *in the laſt* SUPPLEMENT.

1. *By Miſs Betty Boys, of Stainton Vale.*

Cold is the Prize, with all its charms,
  Cold is its warmeſt grace ;
Cold is each path we can diſarm,
  Or from its numbers trace.

Unleſs to thoſe, who chance by lot,
  To gain the laurel'd poſt ;
Then all is warm, the cold's forgot,
  And pleaſant is the *Froſt.*

2. *Addreſs to the Ladies ; by the Rev. Mr. Ewbank, of Thornton Steward.*

In the ſpring, my dear ladies, the flow'rets, like you,
All around appear gay, and are beauteous to view :
But when winter approaches, and *Froſt* comes apace,
Their appearance is chang'd, and they loſe all their grace.
Such a change, lovely creatures, will age make with you ;
So pray manage your prime ; and obſerve this to do,—
Take care ſo to live, till you ſleep in the tomb,
As to glory to riſe, and eternally bloom.

3. *Winter ; by Mr. Olinthus G. Gregory, of Yaxley, Hunts.*

The north wind blows, keen *Froſt*s around
  Extend their dreary reign ;
And drifted ſnows upon the ground,
  Have whiten'd all the plain.

The leafleſs trees in yonder wood,
  A dreary ſight diſplay ;
The half-ſtarv'd birds, to ſeek their food,
  Impatient wing their way.

'Tis thus in life, a few more years
  Will bring us to old age,
And ſilver'd locks, while various cares,
  And vexing ſcenes engage.

Then let's in youth our time employ,
  True wiſdom to obtain ;
That we, when life's chill winter's nigh,
  Mayn't hope for ſpring in vain.

4. *To Vertigo ; by Miſs Louiſa Harpur.*

Friendſhip alone my heart can warm,
  Love's arts I now defy ;
Cupid no more, tho' bright his form,
  Shall coſt this heart a ſigh.

Though fancy's roſes wreathe his hair,
  And wit his features grace ;
Too much his poiſon'd darts I fear,
  The urchin to embrace.

In maiden ſtate I peaceful ſtray,
   Nor dread the *Froſt* of time ;
My footſteps, never mark the way,
   That leads to Hymen's ſhrine.

5. *The Morning's Walk ; by Jacobus of Norwich.*
With haſty ſtep along the glebe,
To ſee the little chirping tribe,
With buſy bill oft peck the ground ;
And roſy health's ſweet grace t'imbibe —
Yes, careleſsly I often ſtray,
And hail the roſy-boſom'd morn—
(If ſhines the cheering god of day)
When the hoar *Froſt* hangs glitt'ring on the thorn.

6. *Addreſs to Venus ; by Mr. James Mulcaſter, of Langly Mill, Northumberland.*
   Tell me, Venus, Cyprian queen,
   Why ſo pleaſing Chloe's mien,
   Why adorn'd with ev'ry grace,
   Why ſo pretty is her face ;
   Why is it divinely fair ?
   But a lover to enſnare.
   Hear me, Venus from above,
   Let the wanton god of love,
   From thy Paphian towers deſcend,
   In my cauſe his bow to bend ;
   Bid him with his fiery dart,
   Melt my Chloe's *Frozen* heart.

7. *A Winter's Day ; by Mr. Philip Norris, of Liverpool.*
   When piercing *Froſt* each ſtream has bound,
   And all our plains are fetter'd round ;
   With loaded gun in rapt'rous glee,
   I trip around the mead or lea ;
   Or elſe on ſkates, my heart's delight,
   Around the marſh I take a flight,
   Which with a friend, the ſcene to cheer,
   I more than ev'ry joy revere.
   And when great Sol's ſunk in the weſt,
   Sit by coal fire, to chat and jeſt ;
   With ſome dear friend or charming fair,
   Life's pureſt bliſs on earth to ſhare :
   Or with converſant Lady Di,
   The irkſome hours paſs with joy.

8. *Addreſs to Formoſa ; by H. A. Thawtemſon, Cheſter-le-ſt.*
   The love that glows within my breaſt,
   And gives to all my hopes a zeſt,
     So permanent and true ;

It ſhall ſurvive all change of place,
·Nor *Froſt* of age ſhall e'er efface
The love I bear for you.

9. *The ſame : by Miſs A. Wood, of Liverpool.*
Laſt night being *froſty*, I had a deſire
To find out the prize as I ſat by the fire ;
But as to the anſwer, I am not quite clear,
So leave it to you to determine next near.

Various other ingenious anſwers to the Prize Enigma were alſo given by Academicus, Amelia, Appleton, I. Archer, J. Aſhcroft, J. Ayres, Job Ayres, Geo. Baron, R. Baxter, R. Bell, Tho. Bowman, J. Brookſbank, G. Browne, J. Browne, Wm. Burdon, Wm. Charles, Geo. Cook, Clericus, Cornubienſis, Hilarius, Joſ. Cox, T. Croſbey, R. Cundall, Joſ. Daubney, Wm. Davis, Ja. Daviſon, Rd. Dening, Nanny Dent, Mrs. Furnaſs, Geo. Gibbs, Sam. Harvey, Tho. Hornby, W. Hoſtman, Sam. Hot, I. Liddell, Mrs. Maken, Wm. Marriot, Paul Meaſor, Parthenia, Geo. Potts, Da. Robarts, Geo. Robinſon, Wm. Robinſon, John Savage, John Taylor, and J. Shackleton.

GENERAL ANSWERS *to the* SUPP. ENIGMAS.

1. *May-day Sports ; by Miſs Betty Boys, of Stainton Vale.*
Laſt May-day betimes, ere the *Froſt* with his treſſes,   7
  Withdrew from the graſſy green mead,
Or Sol on the lark, for his ſhrill ſounding verſes,
  Did ſhed a warm ray round his head ;

I roſe from my *Sleep*, like the *Rainbow* of faſhion,   2
  Our *Stainton-Vale* pleaſures to ſhare,
With bunches of ſnow-drops to cool my fond paſſion,
  · And laurel ſprigs twin'd in my hair.

So ſtraight to the place where each May-day we meet,
  I rambled the meadows along ;
Diverted with ſhepherds who hail'd me complete,
  And grac'd my approach with a ſong.

Then I and young Strephon, the firſt of our train,
  Like *Truſ-well* and *Hughes* did advance ;
Not doating on *Tomb-ſtone*, on *Cartridge*, or *Vane*,   3
  But jocundly led up the dance.

Each couple delightful then tripp'd up in ſtate,
  To honour the firſt day of May ;
Each glaring in colours, in faſhion elate ;
  Not *London* fair beauties more gay.

While Strephon unto me his paſſion declar'd,
  On *Wedlock*, on fancy and love ;
And vow'd how he languiſh'd, he ſigh'd and deſpair'd,
  Leſt I an unconſtant ſhould prove.

With wonder he *Eye*'d me, atteſting his wound   5
  Was more than the *Scythe* could impart ;   4
But ſtop'd in his tale, by the ſpinnet's ſhrill ſound,
  Another freſh dance we muſt ſtart.

Thus dancing and courting we pafs'd the long day,
  Outvying each other in mien,
Till night did her mantle around us difplay,
  And veil ev'ry nymph on the green.

At parting a *Kifs* of each other we took,   1
  My Strephon and I firft began.
Adieu then we bid; fo to relifh your *Book*,   6
  I greet Supplement with our plan.

This ingenious young lady has contrived to bring the anfwers of the Rebufes and Charades alfo into her verfes anfwering the Enigmas; a practice we have always difapproved; as it both renders the pieces too long, and fpoils fome parts of them, by endeavouring to bring in fo many more unconnected words. We therefore advife our correfpondents to avoid fuch a practice, if they would not have their pieces rejected.

2. *Approach of Winter; by the Rev. Mr. Ewbank, of Thornton Steward.*

By the *Vane*, from the mountains of Lapland I'm told 3
That the wind iffues forth, which accounts for the cold;
Froft to me now feems fharp, and I foon muft retire 7
From my walks in the fields, to my *Books* and my fire. 6
When Roger goes out to his herds in the eve,
They to him caft an *Eye*, and expect to receive 5
What the *Scythe* or the hook late had cut from the ground, 4
While the ruftics in *dalliance* and mirth did abound. 1
Near a-*Sleep* now, or dead, lovely nature appears; 2
Which to mortals doth hint, as time adds to their years,
That as life, like the year, will come foon to an end,
It behoves ev'ry foul to reflect, and amend.

3. *To Melancholy; by Mrs. M. Furnafs, of Heddon-on-the-Wall, near Newcaftle.*

Farewell ye fleeting fcenes of mirth;
  With you no more I long to dwell:
But come, fweet Melancholy, come,
  And hide me in thy facred cell.

O! let me *Kifs* thy hallow'd hand,   1
  And plunge me deep in forrow's ftream:
Avaunt vain joys!—but empty names—
  No more my *Eye* regards your gleam.   5

Struck with thy clouded dufky brow,
  Thy fteps I follow thro' the grove:
O'er mountain's top where *Froft* holds fway, 7
  With languid pace again I rove.

True as the *Vane* turns to the wind,   3
  I range with thee thro' midnight gloom;
I court thy haunts, thou penfive maid,
  Nor fly at chearful morning's bloom.

On banks where never gleam'd the *Scythe* 4
I *Books* of ancient learning read ; 6
Or elſe the livelong night I paſs,
Devoid of *Sleep*, among the dead. 2

Thou virtuous friend of grief and woe,
Thy awful ſteps I ſlow purſue,
Thro' groves, where ſilence brooding **reigns**,
And bid to frantic joys adieu.

4. *Approach of Spring ; by Mr. Samuel Harvey, of Lyme.*
Winter is paſt, behold the ſpring appears,
And every thing a pleaſing aſpect wears ;
The Borean blaſt no more is felt around,
Nor nipping *Froſt* is ſeen to *Kiſs* the ground, 7, 1
All nature now awakes as out of *Sleep*, 2
And *Eyes* that long were clos'd begin to peep. 5
The huſbandman again his hopes revive,
To ſee his crops do now begin to thrive ;
He riſes early, late he goes to bed,
And ſcarce has time his prayer *Book* to read : 6
He views the *Weather-cock* more ſure to know 3
Exactly from which point the wind doth blow,
And left his *Scythe* ſhould lie a uſeleſs thing, 4
He well improves the moments of the ſpring.

5. *The Compariſon ; by Mrs. Alethea Wilhelmina Maken.*
As *Froſt* is to the frigid zone, 7
So *Books* are to the wiſe : 6
As is the *Scythe* of time to man, 4
So *Sleep* is to the *Eyes*. 2, 5
And as the *Vane* is to the wind, 3
So *Kiſſes* are to love : 1
But man, vain man is unto truth,
As earth to heav'n above.

6. *Improvement of Time ; by Mr. John Rimmer, Liverpool.*
While night in ſable grandeur reigns,
And ſpreads her curtain o'er the plains ;
Let me, tho' *Froſt* and ſnow abound, 7
And hail beat thick my cot around,
With *Sleepleſs Eyes* the leaves con o'er, 2, 5
Of *Books* replete with wiſdom's lore ; 6
Enrich my mind, while others play,
And idly waſte their time away,
At balls and ſcenes of fancied bliſs,
All night a ſlave to gain—a *Kiſs* ! 1
But truſt not man, nor womankind,
Who pleaſures hunt, for them you'll find }
Like *Weather-cock*s to change their mind. 3

Let coxcombs vain, ye charming fair,
No more participate your care;
Convince the world that you can know
Internal worth from outward flow:
So when the *Scythe* of time appears,   4
To cut the thread of future years,
Difarm'd of terrors death fhall come,
And waft you happy to the tomb.

7. *On Winter*; *by Mr. Tho. R. Smart.*

Winter with icy coldnefs reigns,
   The trees their leaves have loft;
A hoary rime o'erfpreads the plains,
   The rivers bound by *Froft*.   7
No more the fwain employs the *Scythe*,   4
   And eager trips along;
No more he carols gay and blythe,
   While echo joins the fong.
All nature now feems hufh'd to *Sleep*,   2
   The birds forfake the grove;
No more their once lov'd ftations keep,
   Or chant the lay of love.
The lowing kine with watchful *Eye*,   5
   Obferve the threfhing floor;
Or, pinch'd by hunger, venture nigh,
   And crowd about the door.
The *Cock*, the herald of the morn,   3
   In drooping filence waits;
Expectant of his grain of corn,
   Amid his feather'd mates.
Now feated near the focial fire,
   I *read* with bufy care   6
The fav'rite authors I admire,
   And Dia's fecrets fhare.
Or happy with my charming fair,
   I fteal a balmy *Kifs*,   1
From the dear object of my care;
   Earneft of greater blifs.

*Other general and ingenious anfwers to the Supplement Enigmas were
alfo given by Adelina, Appleton, I. Archer, John Afhcroft, James
Ayres, J. Bayley, John Brookfbank, John Browne, Wm. Burdon,
John Cavill, Wm. Charles, Geo. Cook, Jof. Cox, T. Crofbey, Jof.
Daubney, Wm. Davis, James Davifon, John Fildes, G. Gibbs,
O. G. Gregory, Hermes, Tho. Hornby, Jacobus, T. Jaques, Wm. Marriot,
Paul Meafor, Phil. Norris, Da. Robarts, Alex. Rowe, John Savage,
Jof. Scott, and Mifs A. Wood.*

The Difh of Fifh anfwered by Mr. Geo. Cook, of Evering-
ham ; addreffed to the Author, Mr. Jones.

Go on, fweet bard, attune thy lays,
To fing thy friend, Lyfander's praife,
   While merit claims its due ;
'Twill nicely fuit each female wifh,
While dark enig. wraps up each fifh,
   Such pleafing ftrains by you.

Firft *Perch*, then *Carp*, delicious *Chub*,
With *Gudgeon*, *Eel*, and *Pike*, as good,
   By fancy drefs'd fo neat ;
Ah ! were it mine, poetic fire
Shou'd fweep the loud refounding lyre,
   And tell how rich the treat.

The Same anfwered by Mr. Wm. Marriot, of Neath.

Friend Jones, I muft admire your difh
Of well felected Englifh fifh ;
The *Perch*, the *Carp*, and *Eel* in ftore,
And tickling *Chub*,—what would ye more ?
But ftill to make you more inclin'd,
The *Gudgeon* and the *Pike*'s fubjoin'd.———
Suppofe we do, by way of grace,
Some bottles on the table place ;
If you invite me, then I'll dine
With you and friends on fifh and wine.

Anfwers to the Difh of Fifh were alfo given by Meffieurs James
Ayres, John Browne, W. C, John Cavill, Jofeph Daubney, Samuel
Harvey, Rd. Humber, T. Jaques, Alex. Rowe, John Savage, Jof.
Scott, Mifs A. T, and a young Angler.

Answers *to the* Rebuses *and* Charades.

In the Diary.		*In the Supplement.*	
Rebufes.	*Charades.*	*Rebufes.*	*Charades.*
1 Gulfon	1 Teacup	1 Stainton-vale	1 Tombftone
2 Bearcroft	2 Bridegroom	2 London	2 Rainbow
3 Love	3 Teapot	3 Hughes	3 Wedlock
4 Smile or	4 Deathwatch	4 Trufwell	4 Cartridge.
Hornpipe			

Other Anfwers to the Diary Rebufes &c, befide thofe in
the Diary.

10. *By Mr. Philip Norris.*

Could *Smiling* Mifs *Gulfon* young *Bearcroft* approve
As a *Bridegroom*, he'd ever be faithful in *Love*;
United in wedlock fhe'd never want ftore,
Nor *Teapots* nor *Teacups* of porcelain ware ;
Till *Death*, who o'er mortals has ftill *Watch*ful eye,
No rancor might 'twixt them fweet concord deftroy.

11. *The Rural Bridal; by Mr. John Rimmer, of Liverpool.*

With gentler murmurs flow ye streams,
Ye feather'd choirs exalt your themes,
Ye fighing zephyrs breathe more sweet,
To make this blifsful scene complete.
More harmonious found the flute,
Now let no inftrument be mute;
Let care and forrow hence remove,
And in this bow'r be nought but *Love*.
For fee the *Bridegroom* and the bride,
Bearcroft and *Gulfon*, fide by fide,
Advance; the crowd with fhouts befpeak
Their joy, and *Smiles* adorn each cheek.
Now fruits of ev'ry fort appear,
Teapot and *cups* are likewife here,
T' accommodate the fair with tea,
Who fit and chat in focial glee.
Till night, as envious of their joys,
In fable vefture fhrouds the fkies.
The feaft thus o'er, withdrawn each gueft,
The happy pair retire to reft.
No *Deathwatch* calls fhall them annoy;
Who live in peace, in peace fhall die.

12. *Addrefs to Eliza; by Lucius of the Grove.*

While *Bearcroft* fings with happy art,
And *Gulfon* charms her lover's heart,
    When feated by her fide;
Let me of fair Eliza fing,
Tune in her praife' the trembling ftring,
    Of Britifh maids the pride.

Form'd but for pleafures and delight,
Graces and *Loves* in her unite,
    And give refiftlefs pow'rs;
O wou'd fhe deign to be my wife,
How happy then would be my life,
    How bleft wou'd pafs the hours!

Th' enraptur'd *Bridegroom* I fhou'd be,
My lovely maid, poffefs'd of thee,
    Dear Phenix of the ifle;
Teapots and *cups* to pleafe my fair,
I'd buy, and ribbons for her hair,
    To win a placid *Smile*.

The gloomy ev'nings fwift fhou'd pafs,
Enliven'd by the chearful glafs,
    To drive dull care away;
No tinkling *Deathwatch* to affright,
Lock'd in my arms the live-long night,
    Then rife to hail the day.

SUPPL. REBUSES, CHARADES, &c, ANSWERED.

1. *The Wifh* ; *by Mr. James Ayres.*

Grant me, ye powers, a bofom friend,
   Like her of *Stainton Vale*,
In *Wedlock*'s bands to join our hands,
   And *Hughes* fhall fign and feal.

The noted *Trufwell* we'll invite;
   His flights poetic fhine;
Selected few will add delight,
   When Betfey fhall be mine.

Our home repaft perhaps may like;
   At leaft thefe I fhall fketch;
An *Eel, Carp, Gudgeon, Chub,* and *Pike,*
   Compofe our treat, with *Perch.*

Some humble cot in village fweet,
   Far from *City's* bufy fcene,
Shall be our choice; that calm retreat,
   Of joy and peace ferene.

Where ruftic *Tombftones* call to view,
   As *Rainbow* fair appears,
How nymphs were conftant, fwains were true,
   Whilft in this vale of tears.

2. *By Mr. Geo. Cook, of Everingham, Yorkfhire.*

At *Stainton Vale* there lives a fair,
Whofe *Brilliant* cheek, and graceful air,
   May claim the lays of *Hughes*;
And when to *Wedlock* fhe's inclin'd,
May Hymen blefs her virtuous mind,
   And give the maid her dues.

Let no rude Clown, or *London* rake,
As *Graveftone* dull, with her partake,
   Or fhare the marriage joys;
But let him be fome honeft fwain,
As *Cartridge* brifk, who hopes to gain
   The heart of Betty Boys.

3. *By Mr. Samuel Harvey, of Lyme.*

If *Trufwell* and *Hughes* in the country will dine,
I'll treat them with fifh and a bottle of wine;
I have *Gudgeons* and *Chubs*, befides *Eel* and *Dart*,
And if I miftake not, fome *Perch* and fome *Carp.*
Then we'll chat about *London*, or fweet *Stainton Vale*,
Make *Cartridge* or *Wedlock* the theme of our tale;
Then a walk we may take, in the meadows fo gay,
To view the bright colours that *Rainbows* difplay;
And when evening approaches, we'll homeward repair,
Make verfes on *Graveftone*, and fend it next year.

4. *The Same, by Jacobus of Norwich.*

Thofe who a fifhing go, will find
In Nen's pure ftream much pleafure;
But muft confefs, I'm not inclin'd
To fifh; nor have I leifure.

Therefore let thofe who love the fport,
To Nen's fweet banks repair;
Let *Hughes* and *Trufwell* there refort,
And *Carp* and *Pike* enfnare.

Let them the treach'rous hook well bait,
And take *Chubs*, *Eel*, or *Perch*,
With *Gudgeons* too if they await,
And think them worth their fearch.

Then let them hafte to *Stainton Vale*,
To meet fome *London* friend,
And on their fcaly fry regale,
Or elfe as prefents fend.

There Lady Di's charades to fhew,
A *Graveftone* bring to view,
A *Cartridge*, *Wedlock*, and *Rainbow*,
Difclofe them all.——Adieu.'

5. *The Same, by Mr. T. Jaques.*

Can London fhew a wit fo fmart,
    As her of *Stainton Vale*;
Trufwell or *Hughes*, with all their art,
    E'er tell fo fine a tale?

Though they on *Tombftone*, *Rainbow* fing,
    Or *Cartridge* e'er fo fweetly;
She on love, *Wedlock*, any thing,
    Can touch it far more neatly.

6. *The Same, by Mrs. Alethea Wilhelmina Maken.*

Oh! what can *London*'s joys avail,
Or all the charms of *Stainton Vale*!
    Since Damon falfe has prov'd:
Not *Hughes* nor *Trufwell*, bards fublime,
With all their wit and tuneful rhyme,
    Can make this life belov'd!

No treat of fifh my mind can eafe,
Nor thoughts of *Wedlock* longer pleafe,
    Nor *Rainbow*'s tints delight:
For as the *Cartridge* brings relief,
So fhall the *Graveftone* clofe my grief,
    In everlafting night.

7. *The same, by Mr. John Rimmer, of Liverpool.*

Thy Difh of Fifh, fweet Hayford bard,
Is moft delicioufly prepar'd;
Not carnal taftes to gratify,
Who place in eating all their joy.
But mental, fuch as tuneful *Hughes*,
Nor *Trufwell* ever could refufe.
'Tis not for coxcombs of the *Town*;
With them it fcarcely will go down.
But that fair maid of *Stainton Vale*,
To pleafe I'm fure it cannot fail;
She fings with fo much art and eafe,
That even *Graveftone*s learn to pleafe:
From her they feem, it is allow'd,
Like *Rainbow*s in a gloomy cloud.
Happy, thrice happy is that fwain,
Who fhall her hand in *Wedlock* gain!
But ceafe, my mufe, left I be found
To trefpafs on forbidden ground;
For rather than offend the fair,
By *Venus* and her doves I fwear,
This paper I'd in fragments tear;
Of which the largeft part I'd take,
And fpeedily a *Cartridge* make,
Which fhould contain a deadly ball,
And by my own right hand I'd fall.

8. *Addrefs to Mr. W. Wardley; by Mr. Tho. R. Smart, London.*

As late I wander'd thro' the leafy glade,
Sweet rural fcene where erft fo oft we ftray'd,
Bright fhone the moon, while zephyr's gentle breeze
Embalm'd the air, and play'd among the trees;
Thro' contemplation's fertile paths I ran,
And memory this retrofpect began.
    How bleft the time when, feated in a bow'r,
We fpent the pleafing the delightful hour;
Or, more at large, we chofe o'er plains to rove;
Peaceful retreat of innocence and love.
Far from the noife of mad-brain'd war's career,
No murderous *Cartridge* fpreads deftruction there.
Or on Soar's banks, whofe waters gently flow,
Where whifp'ring reeds and weeping willows grow,
Whofe curling waves with ftore of fifh abound;
There *Perch* and *Gudgeon*, *Carp* and *Chub* are found;
The *Pike*, the tyrant of the little fry,
And twining *Eels*, on muddy bottoms lie;
Sweet converfe pafs'd the rolling hours along,
Admir'd the verfe by *Hughes* and *Trufwell* fung;

B

With rapture liften'd to fair Harpur's tale,
Eliza's lay, and that from *Stainton Vale*:
Or rapt in clouds forfook the earth below,
And view'd the maker thro' the lofty *Bow*:
Unknown to care, from *Wedlock*'s fetters free.
Who then fo happy, blythe and gay as we ?——
　But now alas! thofe interviews are o'er,
Thofe entertaining fcenes muft charm no more:
To you 'tis giv'n by fate once more to view
Your much lov'd Eaton, and your blifs renew;
While I alas! my native place forego,
For *London*'s fcenes of folly, vice and fhow;
At diftance we our common lofs deplore,
Our faithful friend Philander is no more;
No more his wit as heretofore fhall charm,
The friends of Di, and every bofom warm;
Untimely loft, bright miracle of truth,
The *Tombftone* covers what was late the youth.
　Yet thro' the gloom a ray of hope appears,
And brighter profpects for my future years,
With health and vigour bleft, in life's gay morn,
Creative fancy fees my joys return;
The focial minutes then fhall fwiftly move,
And generous friendfhip, and the fweets of love,
To fmooth the paffage thro' life's devious way,
And the calm evening crown the bufy day.

9. *Addrefs to Emma; by A. Wood, of Liverpool.*
Tho' Emma, you more charms difplay,
Than can the *Rainbow*'s brighteft ray,
And mean ere long in *Wedlock*'s bands,
With Mr. *Cartridge* to join hands;
Remember you at laft muft die,
And underneath a *Gravestone* lie!
Make virtue then your conftant care,
That blifs eternal you may fhare.

Various other ingenious anfwers to the Rebufes, Charades, &c, were given by the following ladies and gentlemen, viz. Adelina, Appleton, I. Archer, John Afhcroft, J. Bayley, Betty Boys, John Brookfbank, John Browne, John Cavill, Wm. Charles Dalton, Jofeph Daubney, Wm. Davis, James Davifon, Ol. G. Gregory, Tho. Hornby, Wm Marriot, Paul Meafor, Phil. Norris, Alex. Rowe, John Savage, and Jof. Scott.

ANSWERS *to the* DIARY QUERIES.

DIARY QUERY 4 *anfwered by Mifs Nanny Dent.*

Ill nature undoubtedly muft prove a greater bar to connubial felicity than bodily deformity. For whenever ill nature is planted in the breaft of a partner, it occafions continual difcord at home, and often much difturbance and variance with rela-

tions and benefactors abroad. Whereas bodily deformity, though not ſo agreeable to the eye, yet if found with a ſweetneſs of temper, muſt be more productive of domeſtic happineſs than the former : and in my opinion can be no bar at all to the pleaſures of the marriage ſtate.

Miſs Nancy Maſon ſays, I think there is nothing can be a greater bar to the happineſs of the married ſtate than ill nature. For if a perſon have ever ſo genteel an appearance, and be ever ſo beautiful, yet if ill-nature have taken deep root under a fair outſide, beauty, becoming familiar, will ſoon loſe all its charms, and will no longer have the power of attraction; but ill-nature, by continual jarrings and diſagreements, will expel all happineſs, and inſtead of it implant diſcontent, uneaſineſs, and miſery; while, on the other hand, good nature, though accompanied with bodily deformities, by its mild diſpoſition will baniſh all diſcord and variance, and enſure a laſting love and affection.

Mr. John Savage ſays, I am of opinion that ill-nature would be the greater bar. For deformity would be known to the other party before they were joined in wedlock, and if they had a real affection for each other then, I think it could not diminiſh after, becauſe deformity becomes more agreeable with longer acquaintance.

Miſs A. T. of London Wall, ſays, Ill-nature I think muſt certainly be a greater bar to connubial happineſs, than bodily deformity. For a deformed perſon may render himſelf agreeable by his good temper. But an elegant ſhape will not render ill nature agreeable. Beſides, it does not lie in the power of the deformed perſon to alter himſelf; as it does in the ill-natured one to correct his temper. This alone is ſufficient to decide this query.

The SUPPLEMENT QUERIES ANSWERED.

SUP. QU. I *anſwered by Mr. Ralph Burton, of Salton.*

By experiments in Electricity, all bodies abounding with earthy particles, and eſpecially if they are ſulphureous, and their parts ſufficiently agitated, do emit light, in whatever way the agitation is effected. Thus, ſea-water ſhines in a ſtorm; quick-ſilver when ſhaken in vacuo; cats or horſes when rubbed in the dark; and wood, fiſh, or fleſh when putrefied. Perhaps the light is more conſpicuous upon black, than upon coloured bodies; as the pencils of electric fire are beſt ſeen in a dark room.

The Same anſwered by Mr. Thomas Croſbey.

By ſtroking cats in the dark the electrical effluvia with which they abound is very much excited, and ſo begins to make its appearance by ruſhing up the animals' hairs, as up ſo

many rods into the uneleɛtric body; as lightning does from an eleɛtric cloud to an uneleɛtric one, caufing what we call northern lights. But it may be obferved that this phenomenon is not applicable to cats only, as horfes when curried in the dark emit like fparks, though not fo copioufly.

The Same alfo anfwered by Hermes.

The caufe feems to originate with the eleɛtric fluid, which all bodies contain, and with which the hair in particular appears to abound. This being excited by friɛtion, in ftroking the back of the cat, difplays itfelf in the form of luminous fparkles. The fame may be obferved of moft animals, when their coats are rubbed, which muft be done with the grain of the hair. I have remarked, that the hair of horfes in a dark night, when under the hands of the groom, has emitted a confiderable quantity of this luminous matter, which appeared in long ftreams, or lines, anfwering to the teeth of the curry comb.

Sup. Qu. 2 anfwered by Mr. Thomas Crofbey.

Though there are evident veftiges of volcanoes, almoft over the whole face of the globe, yet their caufes and ufe feem the moft difficult to be accounted for, of any phenomenon in nature. It is generally allowed however, that there has always exifted in the earth the fluid called eleɛtric, which is not only the caufe of volcanoes, but of earthquakes, iflands, mountains, and even of air itfelf.—From hence it is eafy to deduce the great utility that volcanoes are of, in giving vent to the vaft quantities of eleɛtric matter that the earth is at different times charged with, which might otherwife render it totally uninhabitable, if not dangerous to its frame altogether. Thefe ferve as a kind of funnels, to vent the fire and vapour that might otherwife caufe dreadful havock, convulfions and earthquakes. Indeed there is fcarce any part of the earth affeɛted with earthquakes, but has one of thefe fiery mouths which are commonly found in flames whenever earthquakes happen, and which foon difgorge that fire and vapour from within the earth's bowels, which was the caufe of the awful difafter.

Jacobus of Norwich fays, Volcanoes and fiery mountains have their peculiar ufes, being a fort of funnel or vent to difgorge the fire and vapour contained in the bowels of the earth, which but for fuch vent would make more dreadful havock by continual earthquakes. And if a central fire is admitted, they are abfolutely neceffary for the prefervation of the earth. And as long as the fire contained in the earth rages under thefe mountains, they throw out their eruptions; but ceafe when the fubterranean fire is exhaufted. And,

Hermes, of Yeddingham, fays, It may be obferved, by what we can gather from the relations of travellers, and the informations of geographers, that volcanoes are moft frequently fituated

in or near thoſe regions, which the nature of their ſubterraneous conformation, or other internal cauſes, have ſubjected to the deſtructive ravages of earthquakes. It therefore ſeems very probable, that they operate as vents, or conductors, which carry off the inflamed matter, that being pent up in the bowels of the earth, by its force and activity, produces thoſe dreadful concuſſions.

SUP. QU. 3 *anſwered by Mr. Ralph Burton, of Salton.*

Limeſtone, by a chemical analyſis, is found to be a compoſition of ſand, calcareous earth, water, and fixed air. By the force of fire it is deprived of the water and air in the proportion of one half of its weight nearly, and is then called quicklime. By ſome late experiments it is proved, that if a clod of lime be kept in very dry air, it will gradually imbibe it, recover its weight, and in time become limeſtone again as originally. But if expoſed to a very humid air, or water be poured upon it, the attraction is ſo ſudden and violent, as to cauſe an ebullition and break the clod to powder.

The ſame by Hermes.—Water is a proper menſtruum, in which all ſalts undergo ſolution. As ſoon therefore as water is poured upon quicklime, it penetrates the pores of the calx, and diſſolves the nitrous particles which are in it. The ſaline particles being thus ſeparated from the more ſolid parts, the force of coheſion is conſequently ſubverted, and the calx falls in pieces and crumbles to powder.

The ſame alſo by Mr. John Roſs.—The conſtituent parts of lime, are earth and fixed air. Now water is well known to have a ſtrong affinity with fixed air: which water therefore being applied to the burnt limeſtone, abſorbs the fixed air contained in it, and leaves the remaining conſtituent, the earth, in the form of a powder.

SUP. QU. 4 *anſwered by Mr. Philip Norris, of Liverpool.*

That flints have originally been in a ſoft, ſlimy, gelatinous, or mucilaginous ſtate, ſeems obvious, and I think quite reaſonable, from their appearance to the eye; and therefore I am inclined to believe, that by ſome ſuch violent means as I ſhall endeavour to explain, they firſt became united, compact, and ſolid. As from the vitriolic or muriatic acids (with which their original ſtate muſt have been replete) being evaporated and expelled by the action of fire, effluvia or other combuſtible matter pent up, uniting and taking fire in the bowels of the earth; by which means, being reduced to a fermentation and ſtate of vitrification; and meeting ſuddenly with ſome acid, denſe and damp vapours, ſo as to cool the former, before the more ſubtle fiery particles could have time to diſtil from the groſſer or calcareous parts, and unite in a ſolid compact maſs beneath them. For by being thus ſuddenly cooled, they may

be fuppofed to have rufhed together with fuch violence, by their extreme attraction, when in that ftate, that they have thereby formed irregular nodules : whilft by their violent attraction and adhefive parts, it may be imagined they muft have drawn the groffer or calcareous parts around them, and as fuddenly became hardened and imbedded in them, as we find them in their native ftrata, chalk, &c.

The fame otherwife anfwered by Mr. Tho. Ridout, of Canterbury.

As that great and glorious luminary the fun was originally the caufe of all fluidity, fo is it alfo, by the powerful operation and conftant influence of its beams, the great caufe of all folidity ; there is not a fingle folid fubftance on the globe, but what on examination exhibits demonftrative proofs of its original fluidity. The very external form of flints fufficiently indicates the yielding nature of their original materials. Some naturalifts have on this account attributed their origin to fufion ; but a more minute examination of fome accidental appearances, fhews the abfurdity of this opinion, (not to mention that the heat required to melt a flint, would have vitrified or confumed almoft every other terreftrial fubftance). I have fome specimens of flint in my poffeffion, which prove that they were formed fince the earth has obtained its prefent temperature, by their having on them the impreffions of animal and vegetable forms. On breaking a large one, I found a complete mufcle in its centre : on another large black one I have a fine cockle, half buried in its fubftance, the other half rifing beautifully above its furface, the flinty fluid having penetrated the minute pores of the fhell, as mercury will thofe of gold, fo that it now appears an intire flint, in which the fineft veins or ribs of the cockle are as perfect as thofe on the living animal. I had alfo another cockle into which the flinty matter had run, and feparated the fhells above half an inch at the fore part, and filled up the concavity between them with fine black flint ; but the outfide of the fhells retained their original colour : although the fubftance of them feemed to be thoroughly penetrated by the fubtle fluid, which by *condenfation produced* the flint.

Various ingenious anfwers to the Queries, both in the Diary and Supplement, were given by Meffieurs James Ayres. John Brookfbank, John Burrow, Ra. Burton, John Chapman, Tho. Coulfon, Thomas Crofbey, Thomas Davis, Mifs Nanny Dent, Rev. Mr. Ewbank, Hermes, T. Hewitt, Thomas Hornby. Jacobus, I. Liddell, Mifs Nancy Mafon, Paul Meafor, Philip Norris, Thomas Ridout, John Rofs, Alex. Rowe, John Savage, Mifs A. T, Rev. S. Vince, and Geo. Webb.   2

New Enigmas.

I. Enigma, *by Oedipus.*

Long may my name adorn Britannia's ifle,
Pervade the lowly cot and ftately pile;
May I like fol enliven ev'ry ftate,
And ftand immutable, as fixt as fate,
Wide as creation's fpace my works difplay,
And fhine for ever in the blaze of day.

Of vice or virtue known to power and pride,
In each I always am their boafted guide;
Whether to punifh or to fanction ill,
I am, oh ftrange to tell, the pretext ftill.
In peace or war all kneel before my fhrine,
And in my name invoke the powers divine.
The grafping tyrant, by ambition fir'd,
Proclaims, his actions are by me infpir'd:
When death and horror ftalk throughout the land,
And defolation fpreads at his command;
In ev'ry fhape fell vice to me lays claim,
And bloodieft actions ftill ufurp my name.

Tho' oft perverted by deceit and art,
Yet I'm implanted in the gen'rous heart;
Where'er I reign, the injur'd I redrefs,
And fuccour innocence in deep diftrefs.
In me each virtue fhines fupremely bright;
I'm made for all, and unconfin'd as light;
I concord breathe, and univerfal love,
An emanation from the realms above.

II. Enigma, *by Mr. S. Oliver, Mafter of the Academy, Lutterworth.*

Ye heaven-born cherubs of creation,
Man's folace while in his probation;
Whofe pulchritude our mis'ry cheers,
Smoothing his rugged vale of tears;
Say, what am I, in magic hands,
That binds your will in facred bands,
Transforming you to diff'rent creatures?
I claim dominion o'er your features,
Command each glowing cheek to fhine:—
Charming before; you're now divine!
When the magician's rites begin,
By me he changes venial fin
To ftrongeft acts of human duty;
That add peculiar grace to beauty.
Witches and wizards, records tell,
Enchant with circle, wand, or fpell;

B 4

A circle I, by necromancy
Enchant, enrapture female fancy;
Whose lovely limbs in me confin'd,
Bring joys celeftial to the mind.
　　Tho' plain, in modeft garb attir'd;
By you am always much admir'd:
Not all the gems of India's coaft,
Not all the gold Peru can boaft,
Not all the treafures land and fea
Produce, can e'er compare with me:
Although I'm not the virgin zone;
I'm th' richeft, pureft bleffing known.
　　Next year inform us what we find,
Gives blifs fubftantial to mankind.

III. ENIGMA, *by Philo.*

Ladies, pray let a friend your favours fhare,
While I my worth and ufefulnefs declare;
For ages paft I've been in Britain known,
But Greece nor Rome e'er claim'd me as her own,
Yet I to wealth and power am near ally'd;
And where ftern war appears I may be fpy'd;
Yea, when contending nations poife the fpear,
Or found the trumpet, I begin the war:
But when the ftrife is o'er and battles ceafe,
I never do difturb the public peace.
If e'er your fpoufes chance to go aftray,
You may be fure 'twas I that led the way;
Yet blame not me, for tho' I lead their will,
I never was concern'd in any ill;
Nay, I fo highly am efteem'd by you,
You're always pleas'd to have me in your view.
Take one hint more, and then farewell I cry,
As Cerb'rus three heads had, e'en fo have I.

IV. ENIGMA, *by Mr. Wm. Rayner, Aylfham, Norfolk.*

I was fo hidden once, as if loft in the ground,
That tho' Adam fearch'd for me, I could not be found;
And yet, what was ftrange, as form'd by a charm,
I was and am ftill but juft under his arm:
And when I was found, appear'd fuch a nice being,
That men do in general think me worth feeing:
Yet they fay I'm a mixture of good and of evil,
As meek as a lamb, and as proud as a devil.
Some will have it, I'm conftant and true as the fun;
And changeable fome as his fifter the moon.
I am weak; yet Diogenes laugh'd at the fcene,
When I twifted the neck of the giant in green:

And Sampſon, tho' bony, broad-ſhoulder'd, and high,
I caught and kept faſt in the wink of an eye.
But for keeping of ſecrets, they ſay it's well-known,
I'm ſo weak and ſo leaky, I can't keep my own.
Yet frail as I am, ſir, I gueſs in your fun,
As few are like me, you have wiſh'd to have one;
And, for which peradventure, you'll fancy me more,
I have not, that I know of, been riddled before.

V. Enigma, *by Miſs Single.*

Dear Ladies excuſe me, a ſmall ſpace I crave,
By the editor's leave in your Diary to have;
Or grant me the favour, I hope he'll conſent,
If worthy, a place in your fam'd Supplement.
I declare I will venture, it's really my plan,
To pleaſe both the ladies and gents if I can.
Behold now I come, if admittance I find,
Supporting my train is young Cupid behind;
Tho' blithe are his looks, you wou'd ſoon plainly ſee,
His arrows obtuſe, if it were not for me;
Nay, but for my aid that ſuch beauty doth ſhow,
His quiver ſuſpended, relaxed his bow.——
　　Believe me ye fair ones this is not the caſe,
For I can adorn the moſt beautiful face;
Or if you're not handſome, can make it appear,
Do greatly improve when my preſence is near;
I diſpell gloomy ſorrow away from the brow,
And the mind tranquillize, for I wonders can do.
May I always attend you, and you me careſs,
Is ſincerely the wiſh of the young poeteſs;
A cheerful companion you'll find me it's true,
Obſequiouſly ladies I bid you adieu.

VI. Enigma, *by Mr. Tho. R. Smart, London.*

Fair friends of Di, in myſtic guiſe,
　　Moſt like poetic fiction,
A thing begs leave to meet your eyes,
　　Made up of contradiction.

Form'd by a wretch in tatters dreſt,
　　Of wants and woes partaker,
Yet many a good and pious prieſt
　　Has oft been deem'd my maker.

My place of birth a ſtraw-thatch'd ſhed,
　　Where ſons of care reſort,
Spring often from a royal head,
　　And finiſh'd in a court.

When dire Bellona rears her shield,
    And thund'ring cannons roar,
Perhaps I'm made—the victors yield,
    And banish'd peace restore.

When peace and plenty fill the land,
    And jocund pleasure reigns,
My influence lights the flaming brand,
    And desolates the plains.

Where ocean rolls his ridgy stores,
    And waves on waves appear,
Full many a ship from foreign shores,
    Unsought, has found me there.

When James the first wore Britain's crown,
    As hist'ries all agree,
Fawkes, who design'd to pull him down,
    Hop'd for success from me.

Sweet mutual love oft ends in me,
    I fit the purpose well,
Yet am when us'd, as all agree,
    Fit emblem of a hell.

Great monarchs form me by their skill,
    And rest upon my aid,
Yet I am subject to the will
    Of every kitchen maid.

I'm clad in white, of foreign kind,
    A slender sprightly elf;
Ladies, ere you my name can find,
    You must become myself.

VII. ENIGMA, *by Sphinx.*

Two centuries or more have pass'd away,
Since first I gladden'd the fair face of day;
At my auspicious coming. darkness fled;
I chear'd the living, and I rais'd the dead;
And tho' my breast soft pity never moves,
I do the deeds that charity approves;
To thousands I dispense their daily food,
Chastise the guilty, and reward the good;
And still for every loan that I receive,
Interest a hundred fold at least I give.
Mean while these contradictions you may trace:
I range the world, and never quit my place;
And tho' of virtues I may fairly boast,
The virtuous often rue me to their cost.
Children I have, some infants, some full grown,
And some their fathers are not pleas'd to own;

Each with an ample portion is endow'd,
By wretched me, with many a groan beſtow'd;
But ſtill no ſooner has he ſpent his ſtore,
Than lo! the prodigal returns for more;
Hard caſe you'll own, attended with this curſe,
That all your favour will but make it worſe;
For the more kind attention you beſtow,
The more you force me to renew my woe.

VIII. or PRIZE ENIGMA, by Mr. J. Stafford, of Bingham.

[*Whoever anſwers it before Feb.* 2, *has a chance, by lot, for
Ten Supplements.*]

When to mankind ſtern fate the mandate gave,
That I to ſerve them ſhould my mother leave,
The cruel deed her tender heart alarms,
For they relentleſs tore me from her arms.—
Ere this ye fair, like you in tender years,
Paternal kindneſs ſoften'd all my cares;
Fed by her ſide, I liv'd 'midſt thouſands more,
And noon-day heat or midnight tempeſts bore.
      By yonder copſe where willows form a ſhade,
In deep reflection 'neath its drooping head,
See the fond youth, while ſeated by his fair,
Try all the arts that thoughtleſs minds inſnare:
Here at my nod a ſwift ſojourner ſee,
Come with reluctance to captivity.
      Deſcend the dreary vault, whoſe arched mound
Reverberates again in doleful ſound;
Along its maſſy walls that time defy,
The tongue or tread of curioſity;
There in the duſt ſee laid a noble race,
Who boaſt of title,—before lords take place;
Here as a centinel to ſtand I'm doom'd,
Oft in a ſhining helmet, o'er th' entomb'd;
Intrench'd ſo deep as ſcarcely to appear;
Compel'd perhaps my general's arms to bear.
You'll ſay my charge with Gallus's may vie,
For know, if I by chance my duty fly,
Legions of captives ſoon, a ghaſtly train,
Ruſh forth, and wild diſorder holds her reign;
Revel at will aloft in dampy air,
Or on the earth run forth their mad career;
Till weakneſs urge its feeble force in vain,
Then down they ſink, ne'er more to riſe again.—
      So when the lark,—the tale in Eſop ſee—
(So pleaſing is the air of liberty,)
Found no impediment its charms to ſhare,
From cage confinement hung in open air,

She up aloft on freedom's pinions rofe ;—
But foon impending ftorms her flight oppofe ;
Baffle the feeble ftrength with which fhe flies,
To earth impels her, where fhe falls—and dies.
　　But great indeed my fervices you'll find,
For know, I oft thro' life fupport mankind.

Now, gents, a fam'd phyfician tell from hence,
　　Who—tho' beneath his care you may deplore
A friend departed, and of confequence—
　　Can oft to life again the dead reftore.

New Rebuses, Charades, and Queries.
I. Rebus, by *Jacobus of Norwich.*

The city famous once for arts and arms ;
He who to foothe the favage beaft had charms ;
He who a Deity, believes there's none ;
To what mankind are all by nature prone ;
The place where noble Hector's blood was fpill'd ;
The walls that queen Semiramis did build ;
Heav'n's fav'rite bird that foars up to the fkies ;
The heathens' blifsful realms or paradife ;
And what more welcome to the human mind,
Than that, which is moft difficult to find.—
The initials join, a name you will explore,
That jolly Britons boaft of, and adore.

II. Rebus, by *Mr. John Savage, of Smithalong grove near Towcefter.*

The time when orient Sol doth rife ;
A kind of fruit we all revere ;
What Gripus more than life doth prize ;
What we with blooming fpring compare ;
The place where veffels oft are bound ;
And what encompaffes us round ;
The tuneful herald of the morn ;
What's often changing, ftill the fame ;
And fhe who died, tho' never born ;
What fhould our warmeft wifhes claim.—
Th' initials join'd, will name a fair,
Whom I fincerely do revere.

III. Rebus, by *Timothy Senfible.*

Take two-thirds of an infect renown'd for its care,
And a colour revers'd, add unto it ye fair ;
Then take what a father with pleafure beholds ;
Join all thefe together, and then it unfolds
The name of a damfel as blythe as the morn,
Whofe wit and good nature her fex do adorn :

In whoſe preſence we're happy and chearful and gay,
And never conſider how time ſteals away.

IV. REBUS, *by Mr. John Wheeler, of St. Auſtell.*

Say firſt what urg'd old Orpheus down
  To Pluto's black domain;
And next a Grecian chief explore,
  Who was by Paris ſlain.

What oft times in yon troubled ſky
  Predicts the coming ſhower;
And what young Strephon gave his fair,
  When ſeated in yon bower.

The initials will, if you combine,
  A ſongſter's name deſcry;
Whoſe rapturous notes, and pleaſing ſtrains,
  Re-echo to the ſky.

I. CHARADE, *by Adelina.*

Kind harbinger of wearied nature's friend,
See from her ebon throne my Firſt deſcend;
A ſolemn ſtilneſs follows where ſhe treads,
And all around my gloomy Next ſhe ſpreads:
Caution the youth my fatal Third to ſhun,
Leſt like poor Eve he taſtes and is undone.

II. CHARADE, *by Mr. Rich. Dening, Chardſtock, Dorſet.*

With Boreas from the ſullen north,
My Firſt does often ſally forth;
My Next, when air is keen and ſmart,
Is ſeen to grace your foremoſt part,
Or in the mild and tranquil morn,
The ragged briar may adorn:
Now tell my Whole, and then you'll ſee
The firſt of Flora's progeny.

III. CHARADE, *by the Rev. Mr. Ewbank, of Thornton Steward.*

My Firſt, lovely ladies, may pleaſe or offend:
My Next is well known, and eſteem'd as a friend:
My Whole either pleaſure or grief may impart;
May ſoothe and delight, or give pain to the heart.

IV. CHARADE, *by Mr. John Fildes, Schoolmaſter, Liverpool.*

In both town and country my Firſt's daily made;
  My Second is neither before nor behind;
My Whole is a place where much mirth is diſplay'd,
  A warm ſnug retreat from a wintry wind.

I. QUERY, *by Mr. Richard Elliott, Liverpool.*

When several persons are in a coach, and draw up the glasses, it is observed that these become so covered with dew, that they can scarce be seen through : but when that is once wiped off, there is seldom any more dew gathers upon the glass, but it mostly continues transparent. And the like happens to a decanter of fresh cold water, when first brought into a warm room, the outside becomes wet and covered with dew ; but little or none returning after this is once wiped off.

II. QUERY, *by Mr. Tho. Hornby, Wimbleton.*

On Saturday, November 17, 1792, about six o'clock in the morning, I observed a rainbow in the north-west quarter about 30 degrees high. Quere how can any philosophical reason be given, why this wonderful appearance was seen before sun rise ?

III. QUERY, *by Oedipus.*

Required the origin and true meaning of the old adage, " True Blue will never stain."

IV. QUERY, *by Mr. I. Stainmore.*

It seems a paradox, that people who are most affected and oppressed with seeing tragedy acted, are always most solicitous to see it performed ? Quere the reason.

Of the SOLAR *and* LUNAR ECLIPSES, &c, *this Year.*

There will happen this year four eclipses of the two great luminaries, viz. two of the Sun, and two of the Moon, but the two latter only are visible in these parts. They happen in the following order.

I. The Sun is eclipsed on Tuesday the 20th of January, at 9 min. past our 12 at night, consequently invisible, both to us, and all other parts of Europe. This eclipse is however central and annular in some parts of the earth, viz, central on the meridian, in the North Pacific Ocean, about $173\frac{1}{2}$ degrees longitude east, and $25\frac{1}{4}$ degrees north latitude. Consequently this will be a very great eclipse, at the Sandwich Isles, the Isles of Japan, with the Ladrone and Philippine Isles. However, along the track of central appearance, as the eclipse is annular, instead of an astonishing gloomy darkness, the spectators will be entertained with a splendid annulus or ring of light, encompassing the moon's dark body quite around her.

II. The second is a visible eclipse of the Moon, on Tuesday, Feb. 3. At the middle of this eclipse, the Moon is vertically over that part of the sandy deserts of Negroland in Africa, about 17 degrees north latitude, and 6 degrees west

longitude. It will therefore be visible quite through Africa and Europe, with the greatest part of America and the west parts of Asia. The time, duration, quantity, and appearance of this eclipse, for London or Greenwich, will be as in the following calculation and construction.

Calculation.

Beginning	-	10^h 59^m
Middle	-	12 25
Ecliptic opp.	-	12 32
End	-	13 51
Duration	-	2 52
Digits	- -	$7°$ 27'

In the construction, VN is a vertical circle ; B E the visible way of the Moon, through a portion of the earth's shadow ; B the Moon at the beginning of the Eclipse, M at the middle, and E at the end of it.
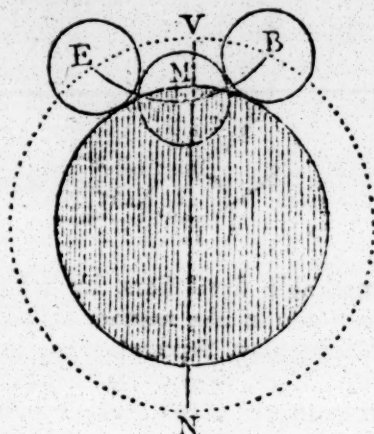
III. July 16, the third is another central eclipse of the Sun, on Thursday, July 16, at half past 7 in the morning; but not visible to any part of Europe, because the Moon then is in south latitude. But the eclipse will be central and total on the meridian, in the Indian ocean, a little to the north east of the island of Madagascar, about $64\frac{1}{4}$ degrees east longitude, and $10\frac{1}{4}$ degrees of south latitude. This eclipse will also be visible along the coast of Africa, to the Cape of Good Hope ; and will extend to the western coast of New Holland.

IV. The fourth and last is another partial eclipse of the Moon, on Friday, July 31, about three quarters past 7 in the morning. Part of it only will be visible here, because the Moon only rises about the middle of the eclipse. At that time the Moon is vertical to the east of the island of Madagascar, in $64\frac{1}{2}$ degrees east longitude, and 19 degrees south latitude. Hence the whole of this eclipse will be visible to the Philippine Isles, with the isles of Borneo, Sunda, Sumatra, and all New Holland, except the eastern coast ; also to all Africa, and most part of Asia and Europe. This eclipse will be on the north limb of the Moon, and the calculation and construction, as in the scheme following, for London ; where HO is the horizontal line, BME the visible path of the Moon's centre, B the beginning of the eclipse, M the middle, and E the end of it.

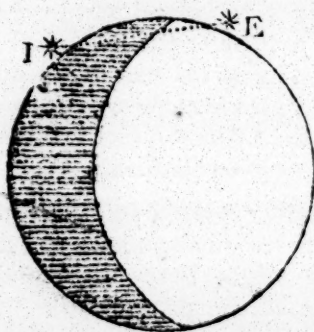*Calculation.*

July 31, afternoon.

Beginning	-	6^h 46^m
Middle	- -	7 42
Moon rises	-	7 46
End	-	8 38
Duration	-	1 52
Digits	-	2° $52'$

Beside the foregoing eclipses of the great luminaries, the Sun and Moon, there will be several transits of the Moon, as usual, over some of the more remarkable fixed stars, by which she will eclipse them. She will also in like manner eclipse the superior planet Jupiter, on Wednesday, September 23, in the evening, which will be visible here, if the weather prove favourable, the Moon being then nearly at her greatest height above the horizon. The appearance will be as in the annexed figure, where the white part of the circle represents the enlightened part of the Moon, and the shaded part the dark of her, at the time. I denotes the place of the star's immersion, or where Jupiter is first hid by passing behind the eastern limb of the Moon, which is 6h. 4m. afternoon; and E is the Emersion, or place where Jupiter comes from behind the Moon on the western side, which is at 6h. 36m. apparent time, at London. It will be visible to the naked eye, but the help of a telescope will make the observation much more perfect and agreeable.
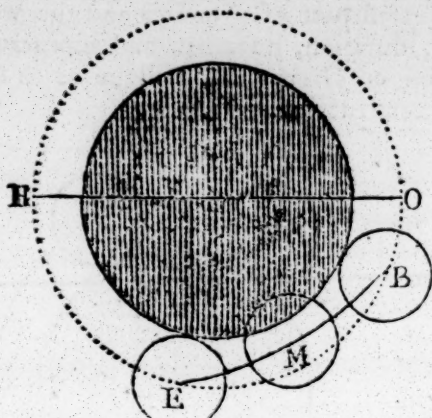
N. B. Letters that contain compositions for the Diary or Supplement, or both, to be sent before the beginning of May, addressed to Dr. Hutton, Woolwich, (post-paid, or they will not be received).——Some letters always come too late to be properly noticed.

ANSWERS *to the* MATHEMATICAL QUESTIONS *propoſed in the laſt* SUPPLEMENT.

I. SUPP. QUESTION 37 *anſwered by the Rev. Mr. Ewbank, of Thornton-Steward.*

To the Editor.—Sir, If you pleaſe to inſert the following ſolution, it will remind Mr. Pearſon of a clergyman who, in an excurſion to the north laſt ſummer, called upon him to take a walk to Tinemouth. It will alſo acquaint his boys to whom they were obliged that afternoon for play.

Solution.—Let $2x$, $3x$, and $4x$ be the height, breadth, and length of the ſchool reſpectively. Then $\sqrt{9x^2 + 16x^2} = 5x$ is the diagonal of the ſchool floor; and $\sqrt{25x^2 + 4x^2} = x\sqrt{29} = 26.9258$ per queſtion. Hence $x = 5$. Conſequently $2x = 10$, $3x = 15$, and $4x = 20$ feet, the dimenſions of the room.

The ſame by Geometr. Conſtr.

Make $Ad = 4$, and dc (perp. to it) $= 3$; draw AcC, and perp. to the plane Adc raiſe $cb = 2$. Draw $AbB = 26.9258$. Draw BC parallel to bc, and CD parallel to cd; ſo ſhall BC, CD, DA be the height, breadth, and length of the room AEBCD.
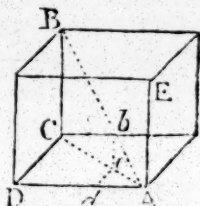
The ſame anſwered by Maſter Wm. Pye, at Mr. Pearſon's School, North Shields.

Having given the conſtruction nearly as above, he then gives the calculation thus: By Eucl. I. 47, $Ad^2 + dc^2 = Ac^2 = 25$, and $\sqrt{Ac^2 + cb^2} = Ab = \sqrt{29} = 5.38516$. Therefore, by ſimilar triangles,

As Ab : AB $\left\{ \begin{array}{l} Ad = 4 : AD = 20 \\ dc\ = 3 : DC = 15 \\ cb = 2 : CB = 10 \end{array} \right\}$ The dimenſions of the room.

or $5.38516 : 26.9258$

or as $1 : 5 ::$

The ſame anſwered by Mr. James Meaſor, *Brighthelmſtone.*

As 26.9258^2 is, by Eucl. I. 47, compoſed of three ſquares, whoſe roots are in the proportion of 2, 3, and 4, it follows that their ſquares muſt be in the ratio of 4, 9, and 16, whoſe ſum is 29; hence this rule, as $\sqrt{29} : 26.9258 :: 2 : 10$ the height; hence the length is 20, and the breadth 15 feet.

Ingenious ſolutions to this queſtion were alſo given by Meſſieurs Academicus, James Adams, W. Atkinſon, Geo. Baron, Bengal Officer, John Bickford. Geo. Birkbeck, John Boyſe, Edw. Bruce, John Bruce, Cha. Brady, John Branſby, Joſ. Brewer, T. Bulmer, Wm. Burdon, Ra. Burton, Colin Campbell, John Cavill, John Craggs, Tho. Cram, Joſ. Daubney, Wm. Davis, Da. Dimbleby. Rd. Elliott, L. Evans, J. Furnaſs, Joſ. Gittins, John Haycock, T. Hewitt, Tho. Hornby,

Rob. Houndall, John Huthersal, J. Jackson, I. Liddell, Wm. Mar-riot, Miss Nancy Mason, Paul Measor, James Mulcaster, Rd. Nichol-son, Cha. Pritty, Wm. Robinson, John Ross, Alex. Rowe, Tho. S. Evans, young Sturge, John Taylor, M. Terry, John Thompson, Tho. Thompson, Henry Wardlaw, David Whitehead, Rob. Wilkinson, and John Wright.

I. SUPP. QUESTION 38 *answered by Mr. John Hay-cock, late of Ware, but now of Sevenoaks, Kent.*

Construction. Take any line AB = 806, the shortest side of the triangle, and draw BD per-pendicular to it; upon which take BE = 426, the longer distance from the middle tree, and upon which as a diameter describe the

circle B I E H ; through the centre of which draw A I G H, and apply AD = AH ; through A and D draw ADC indefi-nitely, upon which let fall the perpendicular BF ; make FK = 384; join BK, and draw BC perp. to BK : so shall ABC be the triangle ; and K, F, D, the three trees.—For AB^2 = $AH \times AI = AD \times AF$; but AD = AH; consequently AF = AI, and FD = IH = 426, the given distance.—The calculation gives AC = 1309·3, BF = 514·2, and the area = 3 Ac. 1 Ro. $18\frac{1}{2}$ Perches.
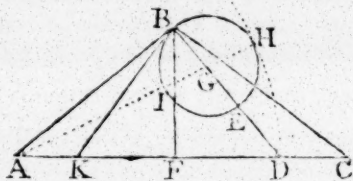
Exactly in the same manner is the Construction given by Mr. John Wright, of West Houghton School; who also adds the following Calculation :

$AG = \sqrt{AB^2 + BG^2} = 833\cdot67$; AD = AH = AG + BG = 1046·67; AF = AD − DF = 620·67;

$BD = \sqrt{AD^2 - AB^2} = 667\cdot737$; and AD : BD :: AB : BF = 514·198; also KF : BF :: BF : FC = 688·54; hence AC = 1309·21, and AC $\times \frac{1}{2}$BF = 336596·43 square links = 3 Ac. 3 Ro. $18\frac{1}{2}$ Perches.

Ingenious constructions were also given by Mr. John Craggs and Mr. Richard Nicholson.

Algebraical Solution to the same, by Mr. Wm. Robinson, late of Alnwick.

Let ABC be the triangular field, and K, F, D, the places of the three trees upon the base or longest side. Then AB = 806, KF = 384, FD = 426; also ABD and KBC and F all right angles. Put AK = x; then AD = $x + 810$. Now because the triangles ABD and ABF are similar, it is AF : AB :: AB : AD, therefore AF $\times$ AD = AB^2, that is $x + 384$ $\times$ $x + 810 = 806^2$; which equation reduced gives $x = 236.66$ = AK. Therefor AF = 620·66 ; also BF $= \sqrt{AB^2 - AF^2}$

= 514·21. Again by ſimilar triangles KF : FB :: FB : FC = 688·54 : hence AF + FC = AC = 1309·2; therefore ½ AC × BF = 336604 ſquare links = 3 Ac. 1 R. 18 Per.

Algebraic ſolutions were alſo given by Meſſieurs Academicus, James Adams, W. Atkinſon, Geo. Baron, Bengal Officer, John Bickford, Geo. Birkbeck, Cha. Brady, John Branſby, Joſ. Brewer, F. Bulmer, Wm. Burdon, Ra. Burton, Colin Campbell, John Cavill, Tho. Cram, Wm. Davis, Da. Dimbleby, Rd. Elliott, L. Evans, J. Ewbank, Geo. Foy, Joſ Gittins, Tho. Hornby, Rob. Houndall, J. Hutherſal, J. Jackſon, J. Knight, I. Liddell, Wm. Marriot, Nancy Maſon, Ja. Meaſor, Paul Meaſor, Ja. Mulcaſter, W. Pearſon, Cha. Pritty, Geo. Robinſon, John Roſs, Alex. Rowe, young Sturge, John Taylor, M. Terry, Tho. Thompſon, Hen. Wardlaw, Da. Whitehead, Rob. Wilkinſon, and Tho. Woolſton.

III. Supp. Question 39 *anſwered by Miſs Nancy Maſon, Clapham, Yorkſhire.*

Firſt 60¾lb. = 972·8 ounces, and 6·553885 are the ounces in a cubic inch of lead, therefore 972·8 ÷ 6·553885 = 148·431 are the cubic inches of lead in the pipe; alſo 148·431 ÷ 108 inches length give 1·37436 the ſurface of the ſection of the ſolid lead. But as the thickneſs of it is $\frac{1}{x}$ of the hollow part, the double thickneſs is $\frac{1}{3}$ of the ſame, and therefore the diameter of both is $\frac{4}{3}$ of the hollow part, or they are to one another as 4 to 3, the ſquares of which are 16 and 9, whoſe difference is 7; conſequently as 7 : 9 :: 1·37436 : 1·767034 = the area of the circle of the hollow part; hence 1·767034 ÷ ·7854 = 2·25 is the ſquare of its diameter, and $\sqrt{2\cdot25}$ = 1·5 or $1\frac{1}{2}$ is the diameter of the hollow part; hence $1\frac{1}{2}$ ÷ 6 = $\frac{1}{4}$ of an inch, is the thickneſs of the lead, as required.

The ſame anſwered by Mr. John Branſby, of Ipſwich.

Put x for the thickneſs of the lead; then $6x$ will be the diameter of the hollow part, and $8x$ the whole diameter of both. Hence (by Hutton's firſt rule for the areas of rings) $14x \times 2x \times$ ·7854 is the area of the ring of lead; which multiplied by the length 9 feet or 108 inches, gives $28x^2 \times$ ·7854 × 108 for the ſolid content of the pipe = 60·8lb = 148·4325 cubic inches, by the queſtion; hence x^2 = ·0625, and x = ·25 or $\frac{1}{4}$ of an inch, the thickneſs of the lead; and conſequently $\frac{1}{4}$ × 6 or $1\frac{1}{2}$ is the diameter of the tube.

The ſame, by Mr. J. Knight, Schoolmaſter at Eſher, Surry.

Put n = ·7854, and x = the internal diameter; hence $\frac{4}{3}x$ is the external diameter; then $(\frac{4}{3}x)^2 - x^2 \times n = \frac{7}{9}nx^2$ is the area of the ſection or ring of the lead, and $\frac{7}{9}nx^2$ × 108 = $84nx^2$ is the ſolid inches of content. Now, by the table of Specific Gravity, pa. 283, Compendious Meaſurer, it will be, as 1728 : 11325 :: $84nx^2$: $432\cdot379x^2$ is the weight of the lead

$= 972 \cdot 8$ ounces by the queſtion; conſequently $x = \sqrt{\dfrac{972 \cdot 8}{432 \cdot 379}}$
$= \sqrt{2 \cdot 25} = 1 \cdot 5$ or $1\frac{1}{2}$ inch, the diameter of the hollow part;
the 6th part of which, or $\frac{1}{4}$ inch, is the thickneſs of the lead.

Ingenious anſwers were alſo given by Meſſieurs Academicus, Adams, Aſhton, Baron, Bengal Officer, Bickford, Birkbeck, Boyſe, Brady, Brewer, Bulmer, Burdon, Burton, Campbell, Cavill, Craggs, Cram, Davis, Elliott, L. Evans, T. S. Evans, Ewbank, Foy, Furnaſs, Gittins, Haycock, Hewitt, Hornby, Houndall, Hutherſal, Jackſon, Liddell, Marriot, Meaſor, Mulcaſter, Nicholſon, Pearſon, Pritty, Robinſon, Roſs, Rowe, Sturge, Swain, Taylor, Terry, Thompſon, Wardlaw, Whitebead, Wilkinſon, and Wright.

IV. Supp. Question 40 *anſwered by the propoſer Miſs Nancy Maſon, of Clapham.*

Weights and diſtances on ſteel-yards, from the fulcrums, to make them in equilibrio, are in reciprocal proportion; hence, as $2 : 30 :: 20lb : 300lb$, the weight of the wood and the liquor together; therefore $300 - 40 = 260lb$, or 4160 ounces, is the weight of the liquor; alſo $\cdot574646$ oz. is the weight of a cubic inch of red wine; therefore $4160 \div \cdot574646 = 7239$ inches is the content of it, which is $= 31$ gallons 2 quarts $1\frac{9}{11}$ pints, the quantity of wine the caſk contains.

The ſame anſwered by Mr. Tho. Ridout, of Canterbury.

If two forces or weights act againſt each other on the arms of a lever, they will continue in equilibrio if their quantities are inverſely as the diſtances between the point to which they are applied, and the point or fulcrum round which the lever turns; therefore by inverſe proportion, as $2 : 30 :: 20 : 300lb$ = the groſs weight; from which take 40 for the tare of the caſk, the remainder is $260lb$, or 4160 ounces; which divided by $\cdot5746 =$ the weight of one cubic inch of red wine, quotes 7238 cubic inches; and this divided by 231. the cubic inches in one gallon, quotes $31 \cdot 333$ or $31\frac{1}{3}$ nearly gallons, the quantity of wine in the caſk.

Anſwers to this queſtion were alſo given by Meſſieurs Adams, Atkinſon, Baron, Bengal Officer, Bickford, Birkbeck, Boyſe, Brady, Branſby, Brewer, Bulmer, Burdon, Campbell, Cavill, Cullingworth, Craggs, Cram, Gundell, Davis, Elliott, L. Evans, T. S. Evans, Ewbank, Furnaſs, Haycock, Heaviſide, Hewit, Hornby, Hutherſal, Jackſon, Knight, Liddell, Marriot, Ja. Meaſor, P. Meaſor, Mulcaſter, Nicholſon, Pearſon, Pritty, G. Robinſon, Wm. Robinſon, Roſs, Rowe, Sturge, Taylor, Terry, Thompſon, Whitebead, Wilkinſon, and Wright.

V. Supp. Question 41 *anſwered by Mr. Tho. Cram jun. Killingworth.*

Let M be the ſummit of the mountain, and ABCE that part of the earth's ſurface ſeen when at M; alſo $DC = DB = 3978\frac{7}{8}$ miles, the radius of the earth, the circumference being

25000 miles, as in prob. 10, Hutton's Menſuration, pa. 197 and 198, 2d edit. and becauſe, by the ſame, the ſurfaces are as the heights or verſed ſines, alſo the circumference multiplied by the diameter gives the whole ſurface; therefore as circumf. x diam. is to diam. or as cir-

cumf. : 1 :: 900^2 : $\dfrac{810000}{25000} = \dfrac{810}{25} = 32\cdot4$ miles $=$ CE, upon
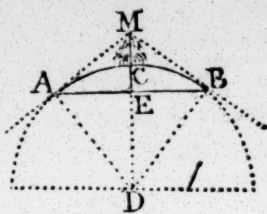
ſuppoſition that the area that is ſeen is 900 miles ſquare, or 810000 ſquare miles, as is expreſſed by the words in the queſtion. Then DC $-$ CE $=$ DE, and by ſimilar triangles, DE : DA :: DA : DM; hence DM $-$ DC $=$ CM $=$ 32·6 miles, the height of the mountain on that ſuppoſition; which is about 15 times as much as it can be.

On the other hand, if we ſuppoſe Sir Wm. Hamilton not mathematically accurate in his expreſſions, but that he meant 900 ſquare miles, which are only equivalent to 30 miles ſquare; then, by a ſimilar proceſs, the height MC will come out only ·036 of a mile, or $63\frac{1}{3}$ yards, or 190 feet, which is as much below the real height, as the former is above it, that height, according to meaſurement, being generally accounted upwards of $2\frac{1}{4}$ miles, or 4000 yards, or 12000 feet. In no way therefore is the expreſſion to be reconciled to any ſort of preciſion.

The ſame anſwered by Mr. I. Furnaſs, of Heddon-on-the-wall, near Newcaſtle.

If we admit the earth's diameter 2AD $= 7957\frac{1}{2}$ miles, the circumference will be 25000 nearly. Therefore (by Dr. Hutton's Menſuration as above), 900 ÷ 25000 $= \cdot036$ miles $=$ CE, the verſed ſine of the ſegment; whence DE $= 3978\cdot839$: then DE : DC :: DC : DM $= 3978\cdot911$ miles; conſequently CM $=$ DM $-$ DC $= \cdot036$ miles $= 63\cdot36$ yards, the mountain's height, on that ſuppoſition, viz. of 900 ſquare miles being ſeen.

Other ingenious anſwers, all concurring with thoſe above, were given by Meſſieurs Academicus, Adams, Baron, Bengal Officer, Bickford, Birkbeck, Boyſe, Brady, Branſby, Bulmer, Burdon, Burton, Campbell, Cavill, Craggs, Davis, Elliott, Haycock, Hewitt, Hornby, Hutherſal, Jackſon, Knight, Liddell, Marriot, James Meaſor, Paul Meaſor, Nicholſon, Pearſon, Rideut, Geo Robinſon, Wm. Robinſon, Roſs, Rowe, Taylor, John Thompſon, Tho. Thompſon, Wilkinſon, and Wright.

VI. SUPP. QUESTION 42 *anſwered by Mr. Cha. Brady.*

Suppoſe P the required point in the line CF joining the centres C, F, of the earth and moon; PB, PD tangents at B and D, and BH, DK, perpendiculars to CF.—Put CB (3979) $= a$, DF (1085) $= b$, CF (60a) $= c$, CP $= x$, and FP $= y$;

then $x : a :: a : \dfrac{a^2}{x} = CE$; and $y : b :: b : \dfrac{b^2}{y}$

$= FI$. Now since the sum of the surfaces of the two segments BGH, DAK, is to be a maximum, it is evident that the sum of the remaining surfaces must be a minimum. But (by Dr. Hutton's Mensuration, 2d ed. p. 199) the surface of a segment, or frustum, is as the product of the radius of the sphere and altitude of the segment, therefore $\dfrac{a^3}{x} + \dfrac{b^3}{y}$ is a

min.; this in flux. gives $\dfrac{a^3}{x^2} = \dfrac{b^3}{y^2}$, or $x^2 : y^2 ::$

$a^3 : b^3$, that is, the squares of the distances, are as the cubes of their radii. From the foregoing equation, and $x + y = c$, is obtained $x = 208982{\cdot}65$, and $y = 29757{\cdot}35$. Let $p = 3{\cdot}1416$, the circumference of a circle whose diameter is unity, then the quantity of surface een $= 2p \times (a^2 \times \overline{1 - \dfrac{a}{x}} +$

$b^2 \times \overline{1 - \dfrac{b}{y}}) = 10471138{\cdot}8458$ &c, square miles.

Other ingenious answers were given by Messieurs Adams, Baron, Bengal Officer, Bickford, Bulmer, Campbell, Cavill, Cullingworth, Craggs, Cram, Elliott, Haycock, Hornby, Hutherfal, Jackson, Liddell, Marriot, Nancy Mason, Ja. Measor, P. Measor, Nicholson, Pearson, Pritty, Robinson, Rowe, Taylor, Thompson, Wilkinson and Wright.

VII. Supp. Question 43 answered by Mr. Wm. Marriot, Neath, Glamorganshire.

By rule 1, pa. 207, Dr. Hutton's Mens. 2d ed. $\overline{3 \times 6^2 + 4^2}$ $\times 4 \times {\cdot}5236 = 496 \times {\cdot}5236 = 259{\cdot}7056$ cubic inches, is the solid content of the whole segment, the half of which $248 \times {\cdot}5236 = 129{\cdot}8528$ is the half of it. Now the value will be different according to the tables of specific gravity; if the inch of pure gold weigh $10{\cdot}359273$ oz. troy, then $129{\cdot}8528 \times 10{\cdot}359273 = 1345{\cdot}1806$ ounces in each share, which multiplied by 4, gives 538ol. 14s. $5\frac{1}{4}$d. for the value of each man's share.

To find where it must be cut: first $4 + \dfrac{36}{4} = 4 + 9 = 13 = a$ is the diameter of the whole sphere; put $x =$ the height of the segment to the proposed section; then $\sqrt{ax - x^2}$ is the radius of the base of that segment; and by the same rule as before $\overline{ax - x^2} \times 3 + x^2 \times x \times {\cdot}5236 =$ its content $= 248 \times {\cdot}5236$ from above; hence $3ax^2 - 2x^3 = 248$, or $39x^2 - 2x^3 = 248$; which gives $x = 2{\cdot}718$ inch. from the top of the segment, or $1{\cdot}282$ inches from the base, and parallel to it.
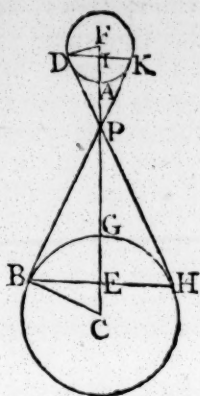
The ſame anſwered by Mr. M. Terry, of Settle.

Firſt $\overline{3 \times 6^2 + 4^2} \times 2 \times \cdot 5236 = 248 \times \cdot 5236 = 129 \cdot 8528$ is the content of each half. And the diameter of the ſphere being 13, by the 2d rule for Segments, $\overline{3 \times 13 - 2x} \times x^2 \times \cdot 5236$ $= \overline{39x^2 - 2x^3} \times \cdot 5236 = 248 \times \cdot 5236$, or $39x^2 - 2x^3 = 248$, from whence x is found $= 2 \cdot 7183$ nearly.

Again, as $1728 : 259 \cdot 7056 :: 19640$ (ſpec. grav. of pure gold in Hutton's table of Spec. Grav. Compendious Meaſurer, pa. 283) $: 2951 \cdot 7465$ ounces, the weight of the whole ſegment; therefore $2951 \cdot 7465 \times 4 = 11806 \cdot 986$ the value of the ingot, and conſequently each man's ſhare is 5903l. 9s. 10d.

Ingenious anſwers were alſo given by Meſſieurs Adams, Baron, Bengal Officer, Bickford, Birkbeck, Brady, Branſby, Brewer, Bulmer, Burdon, Burton, Campbell, Cavill, Craggs, Cram, Davis, Elliott, Furnaſs, Haycock, Hewitt, Hornby, Houndall, Hutherſal, Jackſon, Knight, Liddell, Nancy Maſon, Ja. Meaſor, P. Meaſor, Mulcaſter, Nicholſon, Pearſon, Pritty, Geo. Robinſon, Wm. Robinſon, Roſs, Rowe, Taylor, Thompſon, Wardlaw, Whitehead, Wilkinſon, and Wright.

VIII. *or* SUPP. PRIZE QUESTION 44, *anſwered by Mr. Colin Campbell, Kendal.*

Let AP be the horizontal plane, ABDC the fruſtum, HK its axis, G the centre of gravity, and let HK produced meet AP in P, then it is evident that APB will be the cone completed. Now as the fruſtum, from the nature of the problem, receives a rotatory motion round its axis KH, the velocity of any two points A and C on the plane, will be as AB to CD, or as PH to PK, or as PA to PC, and therefore P is ſtationary, and the lines PA and PC deſcribe circles round P. But the area of the circle PA is to that of PC, as AB^2 to CD^2, and the crown ring moved over by the fruſtum
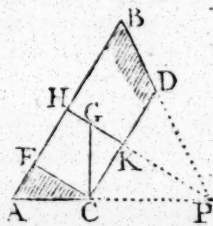
$=$ the area of the circle PA $\times \dfrac{AB^2 - CD^2}{AB^2}$; therefore it is a minimum when the area of the circle PA is a minimum. Conſequently the requiſite of the problem is to be found by drawing a line from G perp. to AP meeting it in C: For if this line cut between P and C, the fruſtum will not ſtand on the ſlant ſide.—But $KG = \dfrac{114}{49} \times \frac{1}{4}KH$ by Hutton's Mathematical Miſcellany, Art. 12, and the triangles AHP, CGK are ſimilar, therefore $HA = \frac{5}{2} : HP = \frac{5}{2} HK :: KG = \dfrac{114}{49} \times \frac{1}{4}KH : KC = \frac{3}{2}$, hence $HK = 7\sqrt{\frac{1}{19}}$; therefore the ſpace rolled over is $= 4 \times \overline{PH^2 + HA^2} \times \cdot 7854 \times \dfrac{AB^2 - DC^2}{AB^2}$ $= 5$ ſquare yards nearly.

The same answered by Mr. Wm. Pearson, Teacher of the Mathematics, North Shields.

Let ABDC be the frustum, G its centre of gravity, and GC perp. to AP.—Then, by Emerson's Mechanics, prop. 1, of the Centre of Gravity, when GC falls without the side of the frustum, it then will not stand, but will turn upon its less end, and the question will be impossible; and when the said perp. GC falls within the side of the frustum, it will then stand, and the question will not be limited, but will admit of an infinite number of answers. Hence, in the present case, GC must fall exactly in the extremity of the less end, and the frustum will then be the least possible under these circumstances to turn round on its side, consequently will roll over the least space.

This being premised, draw CF parallel to KH; and put $AB = 5 = a$, $CD = 3 = b$, their dif. $= 2 = d$, and $HK = x$; then by Art. 12, Hutton's Miscellany, $\frac{6a^2 - 4ad + d^2}{3a^2 - 3ad + d^2} \times \frac{1}{4}x$, or $2\cdot32653 \times \frac{1}{4}x$, or rather $m \times \frac{1}{4}x = GK$, the distance of the centre of gravity from the less end of the frustum.—Again, by similar triangles, $CF : AF :: CK : KG = \frac{3}{2x}$; therefore $\frac{3}{2x} = m \times \frac{1}{4}x$; hence $x = \sqrt{\frac{6}{m}} = 1\cdot60591$.

Again, by Eucl. I. 47, $\sqrt{CF^2 + AF^2} = AC = 1\cdot8918$.

And, by sim. tri. $AF : AC :: AH : AP = 4\cdot7295$.

Also, by the same, $AF : AC :: CK : CP = 2\cdot8377$.

Then, by prob. 11, part 2, sect. 1, Hutton's Mensura. 1st. edit. $\overline{2AP + 2CP} \times \overline{2AP - 2CP} \times \cdot7854 = 44\cdot9739$ square feet, or $4\cdot9971$ square yards, as required.

Answers upon true principles were also given by Messieurs Geo. Baron, John Bickford, Geo. Birkbeck, Cha. Brady, Jos. Brewer, T. Bulmer, John Craggs, Elliott, John Griffith, Wm. Hardy, John Hutherfal, J. Jackson, I. Liddell, John Mitchell, Wm. Robinson, John Rodham, John Taylor, M. Terry, Tho. Thompson, A. A. Todd, Tho. Whiting, Rob. Wilkinson, and John Wright. The other answers received were not right.

ANSWERS to DIARY QUESTIONS.

I. DIARY QUESTION *answered by Mr. C. Pritty, Thornham, Suffolk.*

Let ABCD (*fig. in the Diary*) represent the tub, and AF, DE perp. to CD or AB. Put $AB = a = 48$ inches, $AD = d = 50$, $BD = c = 50$, and $x = CD$ the bottom diameter of the tub; then will $BE = FC = \frac{1}{2}a - \frac{1}{2}x$, and by Eucl. II. 12, $AD^2 = AC^2 + CD^2 + 2CF \times CD$, that is, $d^2 = c^2 + x^2 + x \times \overline{a - x} = c^2 + ax$, whence $^* x = \frac{d^2 - a^2}{a} = 33\frac{1}{3}$, and CF or $\frac{1}{2}a - \frac{1}{2}x = 7\frac{1}{3}$, and the perp. height of the tub $AF =$

$\sqrt{c^2 - CF^2} = \sqrt{900 - 53\frac{7}{9}} = 29\cdot09$. Then, by the rules for menſuration or gauging, the tub is found to contain 38194 cubic inches $= 165\frac{1}{3}$ wine gallons, or $135\frac{1}{2}$ ale gallons nearly.

* *Note*. Hence it appears, that the product of the top and bottom diameters of a fruſtum of a cone, is equal to the difference between the ſquares of the diagonal and ſlant ſide. Being the ſame in effect, and the general caſe of this property in the cylinder, namely, that the product of both ends (being the ſame as the ſquare of one end) is equal to the difference between the ſquares of the diagonal and perpendicular height.

II. DIARY QUESTION *anſwered by Mr. John Wright, of Weſthoughton School.*

Here it is plain that the yearly advantage derived to the farm by the draining, may be conſidered as an annuity. And the queſtion is, To find in what time the amount of the ſaid annuity will be equal to the amount of the ſum laid out at the given rate; compound intereſt being allowed both upon the ſum laid out, and on the advantage, which I ſuppoſe was implied in the queſtion.

In order to give a general ſolution to queſtions of this kind; let a repreſent the annuity or yearly advantage, b the ſum laid out, r the amount of 1 pound for a year. Then, by Simpſon's Algebra, pa. 237, $a \times \dfrac{r^x - 1}{r - 1}$ will be the amount of the annuity a in the time x; likewiſe br^x will be the amount of the ſum b for the ſame time. Then by the queſtion

$a \times \dfrac{r^x - 1}{r - 1} = br^x$, and hence $x = \log. \dfrac{a}{a + b - rb} \div \log. r = $ 14·2067 years, the required time in the preſent caſe.

III. DIARY QUESTION *anſwered by Mr. Cullen O'Conner.*

LEMMA. The area of any right ſegment ABC of a parabola, is as the cube of its baſe AC; and the area of an oblique ſegment AFE, is as the cube of AK, the ſegment of the right baſe cut off by EK parallel to the axis, or perpendicular to the baſe.—For, any ſegment, as AFE, is two-thirds of its circumſcribed parallelogram AHIE, which is equal to AH or FG × AK; but the abſciſs FG is as the ſquare of the baſe AE, which is as the ſquare of AK; theref. the area is as $AK^2 \times AK$ or AK^3. In like manner the area ABC is as AC^3.

SOLUTION. Let ABC be the parabola; its baſe AC = 10, its axis BD = 15, and AE the required line dividing the area (100) in the ratio of 3 to 2, or to make AFE = 40, and AEC = 60. Draw EK perp. to AC; then, by the lemma, as ABC : AFE or as 5 : 2 :: AC^3 or 10^3 : $AK^3 = \frac{2}{5}$ of 10^3; therefore $AK = \sqrt[3]{400} = 7\cdot368063$; hence KC = 10 − AK = 2·631937.
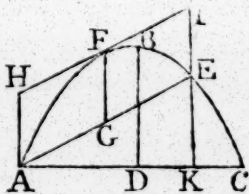
Now the parameter being a 3d proportional to the abfcifs and ordinate, as $BD : AD :: AD : \frac{25}{15} = \frac{5}{3} =$ the parameter; then by Hutton's Conic Sections, prop. 2, as the param. $\frac{5}{3} : AK ::$ KC $: KE = 11\cdot63537$; hence, by right-angled triangles, AE $= \sqrt{AK^2 + KE^2} = 13\cdot7608$, as required.

IV. Diary Question *anfwered by the Rev. L. Evans.*

Let AE reprefent the rod, A, B, C, D, E, the places of the cafk a and the weights b, c, d, e, alfo F the fulcrum or centre of gravity of the whole,

reduced to the rod. Then, by mechanics, the point F will be found, either by making the fum of the products, of the weights by their diftances from F, equal on both fides ; or by making the products of all the weights multiplied by their diftances from either of the ends of the rod, equal to the product of the fum of all the weights by the diftance of the fulcrum from the fame end. Hence then thefe principles
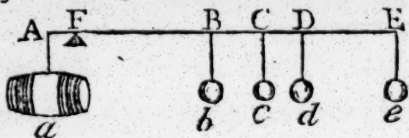
give $AF = \dfrac{AB \times b + AC \times c + AD \times d + AE \times e}{a + b + c + d + e} = 2,$

and $FE = \dfrac{AE \times a + BE \times b + CE \times c + DE \times d}{a + b + c + d + e} = 24.$

V. Diary Question *anfwered by Mr. Wm. Marriot, of Neath.*

The area of an equilateral triangle whofe fide is 1, being $\cdot433013$; and the fides, and other dimenfions, of fimilar triangles, as the fquare roots of their areas; we have $\sqrt{\cdot433013} : \sqrt{10000} :: 1 : 151\cdot9756$, the fide of the equilateral triangle whofe area is 10000: Again, the diameter of its infcribed circle will be equal to 4 times the area divided by the fum of its three fides; therefore $-\dfrac{40000}{151\cdot9756} \times \frac{1}{3} = 87\cdot7332$ is that diameter, and its area $87\cdot7332^2 \times \cdot7854 = 6047\cdot3136$, which is alfo the area of the walk; hence their fum $16047\cdot3136 =$ the area of the bounding triangle HIK *(Fig. in the Diary).* Then as $\sqrt{\cdot433013} : \sqrt{16047\cdot3136} :: 1 : 192\cdot5196$ the fide HI of this triangle. Now, if the given triangle ABC were to be furrounded by a fimilar triangle HIK, the breadth of the walk would be equal to its area divided by half the perimeters of the two, that is, $DG = \dfrac{6047\cdot3136}{AB + HI} \times \frac{2}{3} = 11\cdot702$ feet the breadth of the walk.

But the breadth of the walk is required to be every where the fame; therefore in ftrictnefs the corners muft be circular, having a radius equal to the breadth of the walk: now each

circular corner is evidently equal to $\frac{1}{4}$ of a circle whoſe radius is that breadth. Whence (*as in the Diary*) that breadth is found to be 12·23.

VIII. DIARY QUESTION *anſwered by Mr. Colin Campbell, Kendal.*

Let AD be the inclining bottom of any ſewer; draw AB parallel, and BD perp. to the horizon; make AG parallel to BD, and perp. to AD draw GH = the depth of the water at A.—Now the preſſure of the water on AD is to its preſſure in GA, as AB to DA, which is in both caſes indefinitely near equal; and therefore the motion of the water at A parallel to AD ariſing from the preſſure on AD will be the ſame, that is, the quantity diſcharged on this account at A will be indefinitely near the ſame in both caſes. But the velocity acquired by the particles in ſliding down the plane DA, will be as $\sqrt{DB}$, that is, in the preſent caſe as $\sqrt{3} : \sqrt{12}$, or as 1 : 2. Hence it appears, that in theory the longer courſe will have the advantage; but in practice, the friction, accidental obſtructions, and weeds ought to be taken into conſideration, which will undoubtedly produce a difference in favour of the ſhorter drain.

The ſame anſwered by Amicus.

Since each ſewer has the ſame aperture, the ſame quantity of water will run into each in the ſame time. And to find in what time a given ſmall quantity of water entering each with the ſame velocity of c feet per ſecond, will run along each of the inclined planes; let $b = 32\frac{1}{6}$, and $x =$ any given length; then for the longer ſewer, $\dfrac{b\dot{x}}{880} = v\dot{v}$, $v = \sqrt{\dfrac{bx}{440} + c^2}$, time $= \dfrac{880}{b}$ $\sqrt{\dfrac{bx}{440} + c^2}$; when $x = 10560$, time $= \dfrac{880}{b}\sqrt{24b + c^2}$. And in like manner the time through the other will be found $= \dfrac{880}{b}\sqrt{24b + c^2}$; or the times are as $\sqrt{24b + c^2}$ to $\sqrt{24b + 4c^2}$.

IX. DIARY QUESTION *anſwered by Mr. Rd. Elliott, Liverpool.*

Let x and y repreſent the chapters; then, by the queſtion, $x^2 - y^2 = 1485 = a$, and $x^3 - y^3 = 66177 = b$. Put $x + y = s$, and $x - y = d$; then $x^2 - y^2 = sd = a$, and $x^3 - y^3 = \frac{3}{4}ds^2 + \frac{1}{4}d^3 = b$: from the firſt equation $s = \dfrac{a}{d}$; this ſubſtituted for s in the ſecond, and reduced, gives $d^4 - 4bd = -3a^2$, from which $d = 27$, and $s = 55$. Hence $x = 41$, and $y = 14$, which chapters I find to anſwer to December 14; ſo that they

are the 41st chapter of Ifaiah, and the 14th chapter of the Acts of the Apoftles.

The fame anfwered by Mr. John Branfby, of Ipfwich.

Put x for the figure in the ten's place of the number for the firft leffon, and y for the units figure of the fame number; then will $10x + y$ and $10y + x$ be the refpective numbers of the two leffons. By the queftion, $99x^2 - 99y^2 = 1484$, or $x^2 - y^2 = 15$. Now as x and y are both integers, neither of which exceeds 9, they muft be either 4 and 1, or 8 and 7, that the difference of their fquares may be 15: the two numbers are therefore either 41 and 14, or 87 and 78; but they are evidently the two former, for the difference of their cubes is 66177, agreeing with the laft condition of the queftion. The day correfponding is Dec. 14.

X. DIARY QUESTION anfwered by Amicus.

Suppofe nOPQ to be the horizontal plane, RPQ the inclined one, PQ their interfection, OQ the given direction of the wind, OR that of the falling rain, RQ a line or fection of the inclined gauge, nR perp. to QO produced, and nP to PO. Join RP, which is neceffarily

perp. to PQ; then the angle nPR ($5°$) and PnR right, being given, the triangle PnR is given in fpecie, and the ratio of nP to nR is given; and becaufe nQP the direction of the wind is given, and the angle nPQ right, the ratio of nP to na is given, and confequently the ratio of nR to nQ is given, and the triangle RnQ is given in fpecie; but RQ is given in length, and confeq. the triangle RnQ is given; but the angle nOR ($30°$) made by the falling rain is given, confeq. On is given, and nQ $\mp$ O$n = $ OQ is given, which is the line on the horizontal plane receiving the fame quantity of water as RQ on the inclined one; and as this holds for every line parallel to QR on the furface of the gauge, and their number the fame whether it be inclined or horizontal, we have as OQ : q :: RQ : the quantity required, let the form of the gauge be what it will.

XI. DIARY QUESTION anfwered by Mr. John Wright, Wefthoughton.

Produce CA till AH = AD (*Fig. in the Diary*); on CH as a diameter defcribe a femicircle, which will be the required locus.—For, draw any chord CF cutting the circles in EGF, and join FH, GA, ED. Now the angles at F, G, E (being in femicircles) are right ones, and therefore the lines HF, AG, DE are parallel; confeq. AD : AH :: GE : GF; but AD = AH, and therefore GE = GF, as per queftion.

XII. DIARY QUESTION anfwered by Mr. Tho. Thompfon, of Norley.

Let $d = $ fine of fun's declination, a the fine of his greateft meridian altitude, and c the fine of his leaft; alfo $x = $ the

height of the tree. Then (by Simpson's Fluxions, prob. 30)

$$\frac{dx}{ac} = 245 = b, \text{ or } x = \frac{abc}{d} = 100\cdot095 \text{ feet} = 33\cdot365 \text{ yds.}$$

and $\dfrac{2dx}{\sqrt{ac}} = 384\cdot724$ feet, the conjugate axis of the curve;

hence 72·302 feet is the length of the tree's shade at noon, or the abscifs of the curve; and the area is found $= 21808$ sq. feet.

XIII. DIARY QUESTION *answered by Mr. Colin Campbell, Kendal.*

First, when x does not exceed 1, $\dot{z} = \dot{x} - x^3\dot{x} + x^6\dot{x}$ &c, and $z = x - \frac{1}{4}x^4 + \frac{1}{7}x^7 - \frac{1}{10}x^{10}$ &c, which is correct; therefore when $x = 1$,

$$z = 1 - \frac{1}{4} + \frac{1}{7} - \frac{1}{10} \text{ \&c} = \frac{3}{1.4} + \frac{3}{7.10} + \frac{2}{13.16} \text{ \&c.}$$

Again, when x is not less than 1, then

$$\dot{z} = \frac{\dot{x}}{x^3} - \frac{\dot{x}}{x^6} + \frac{\dot{x}}{x^9} \text{ \&c, and } z = d - \frac{1}{2x^2} + \frac{1}{5x^5} - \frac{1}{8x^8} \text{ \&c;}$$

and when $x = 1$,

$$z = d - \frac{1}{2} + \frac{1}{5} - \frac{1}{8} + \frac{1}{11} \text{ \&c} = d - \frac{2}{2.5} - \frac{3}{8.11} - \frac{3}{14.17}$$

&c. Now the two values of z in this case being equal, we have

$$d - \frac{3}{2.5} - \frac{3}{8.11} - \frac{2}{14.17} \text{ \&c} = \frac{3}{1.4} + \frac{3}{7.10} + \frac{3}{13.16} \text{ \&c, hence}$$

$$d = 3 \times : \frac{1}{1.4} + \frac{1}{7.11} + \frac{1}{13.17} \text{ \&c} + 3 \times : \frac{1}{2.5} + \frac{1}{8.11} + \frac{1}{14.17}$$

&c $= 1\cdot21104$, theref. $z = 1\cdot21104 - \dfrac{1}{2x^2} + \dfrac{1}{5x^5} - \dfrac{1}{8x^8}$ &c.

Cor. When x is infinite, $z = d$.

Schol. The sum of the two compound series

$$\frac{1}{2.5} + \frac{1}{8.11} + \frac{1}{14.17} \text{ \&c, and } \frac{1}{1.4} + \frac{1}{7.11} + \frac{1}{13.17} \text{ \&c, may}$$

be found by Increments. But they will be much easier and quicker found, by finding the sums of their several constituting simple alternate series $1 - \frac{1}{4} + \frac{1}{7}$ &c, by Dr. Hutton's method in the second of his Tracts.

XV. *or* DIARY PRIZE QUESTION *answered by Amicus.*

Bisect the given side BC in G (*fig. in the Diary*), at a distance $=$ BG $=$ GC, draw HA parallel to BC, produce BC to K till GC² : GK² :: 8 : 3, draw KA perp. to BK cutting HA in A, join AB and AC, and ABC is the required triangle.

For AK $=$ GC, AB³ $+$ AC³ $= \overline{\text{AB} + \text{AC}} \times$

$\overline{\text{AB}^2 + \text{AC}^2 - \text{AB} \times \text{AC}}$, but AB² $+$ AC² $= 2$AG² $+ 2$BG²

$= 2AG^2 + 2AK^2 = 2GK^2 + 4AK^2 = \frac{16}{3}AK^2 + 4AK^2$
$= \frac{28}{3}AK^2$; but $CK = GK - AK = AK\sqrt{\frac{8}{3}} - AK$,
$CK^2 + AK^2 = AC^2 = AK^2 \times \frac{8}{3} - 2AK^2\sqrt{\frac{8}{3}} + 2AK^2$
$= AK^2 \times \overline{2 - \sqrt{\frac{2}{3}}}|^2$, $AC = AK \times 2 - AK\sqrt{\frac{2}{3}}$, $AB^2 =$
$\frac{16}{3}AK^2 + 4AK^2 - AC^2 = AK^2 \times \frac{8}{3} + 2AK^2\sqrt{\frac{8}{3}} +$
$2AK^2$, $AB = AK \times 2 + AK\sqrt{\frac{2}{3}}$, $AB + AC = AK \times 4$,
$AB \times AC = 4AK^2 - AK^2 \times \frac{2}{3} = \frac{10}{3}AK^2$, $AB^2 + AC^2$
$- AB \times AC = 6AK^2$, and $AB + AC$ being $= 4AK$;
$AB^3 + AC^3 = 24AK^3 = 3BC^3$.

The same answered by Mr. J. Hartley, Fleet-street.

Let BC be the given bafe, $GC = GH = \frac{1}{2}BC$, extend GH
to $L = 3GC$, through BLC defcribe a circle, and draw HA
parallel to BC; join AB, AC, fo fhall ABC be the triangle
required.

For, draw EI perp. to AB; then, by Simpfon's Trigon.
prob. 18, $AI = \frac{1}{2}AB + \frac{1}{2}AC$, or half the fum of the fides
AB, AC. By the nature of the circle $LG : GC :: GC : GE$
$= \frac{1}{3}GC = \frac{1}{3}GH$; and by the faid prob. 18, $GE : EH :: GC^2$
$: AI^2$; whence $AI = AB = 200$, and $AB + AC = 400$,
which call a, and the fum of their cubes mult. by $3 = 24000000$

$= b$, then will $AB = \dfrac{a}{2} + \sqrt{\dfrac{b}{3a} - \dfrac{a^2}{12}} = 281\cdot649$, and

$AC = 118\cdot351$, the fides requ¹red.

The same answered by Mr. John Wright, Wefthoughton.

Take the line M a mean proportional between the bafe BC
and $\frac{1}{6}BC$; upon BC defcribe a triangle fuch, that the fide AB
$= BC + M = 281\cdot64965$, and $AC = BC - M = 118\cdot35035$,
and the thing is done.

For it is well known that $AB^3 + AC^3 = 8BC^3 + 6M^2$
$\times BC$; and by conftr. $6M^2 = BC^2$; therefore $AB^3 + AC^3$
$= 3BC^3$, as it ought. Alfo, (by Hutton's Menfur. rule 3,
pa. 97), $\frac{3}{2}BC \times \frac{1}{2}BC \times \overline{\frac{1}{4}BC - M} \times \overline{\frac{1}{2}BC + M} = \frac{3}{4}BC^2$
$\times \frac{1}{4}BC^2 - M^2 = \frac{1}{16}BC^4 =$ the fquare of the area, or $\frac{1}{4}BC^2$
$= 10000$ the given area.

Mr. Cullen O'Connor, after his geometrical folution, gives
fome algebraical calculations. Having difcovered that, in the
prefent queftion the fides of the triangle are in arithmetical
progreffion; he remarks that, by taking the fides always in
fuch progreffion, the fum of the cubes of two fides may be
made to have any given ratio to the cube of the third fide.
Thus, let a denote this fide, $a + y$ and $a - y$ the two other
fides, the fum of whofe cubes fhall be m times that of the
third or given fide a. Now $\overline{a + y}|^3 + \overline{a - y}|^3 = 2a^3 + 6ay^2$

$= ma^3$ in this cafe, or $2a^2 + 6y^2 = ma^2$; hence $6y^2 = \overline{m-2} \cdot a^2$, and $y\sqrt{6} = a\sqrt{m-2}$, or $y = a\sqrt{\dfrac{m-2}{6}}$ the common diff. of the fides; thence the two other fides are $a + y = a\left(1 + \sqrt{\dfrac{m-2}{6}}\right)$, and $a - y = a\left(1 - \sqrt{\dfrac{m-2}{6}}\right)$.

When $m = 3$, as in the queftion, thefe fides become $a\left(1 \pm \sqrt{\tfrac{1}{6}}\right)$.

NEW QUESTIONS.

I. QUESTION (45), *by Mr. Nicholas Barrow.*

What is the length of the fhorteft line that can poffibly be drawn round an acre of land?

II. QUESTION (46), *by Mr. James Hill.*

How long will a perfon be counting a million of millions of guineas, at the rate of 100 per minute; counting 6 ho. each day?

III. QUESTION (47), *by J. B. Efq.*

What are the odds, at the game of Whift, that the dealer holds all the thirteen trumps in his own hand?

IV. QUESTION (48), *by the Rev. Mr. L. Evans.*

In Dr. Hutton's Menfuration, 2d edit. pa. 114, or 1ft edit. pa. 82, are thefe expreffions,

$$\sqrt{\frac{6 + 2\sqrt{5}}{10 - 2\sqrt{5}}} = \sqrt{1 + \tfrac{2}{5}\sqrt{5}}\ ; \text{ and } \sqrt{\frac{2 + \sqrt{2}}{2 - \sqrt{2}}} = 1 + \sqrt{2}.$$

Quere an inveftigation.

V. QUESTION (49), *by Mr. W. Pearfon.*

To meafure a pond being afk'd; when I went,
I found that to puzzle was all the intent.
The three fides to have meafur'd they did not incline;
So each fide I produc'd juft in a right line;
And, trying a while in different ftations,
Found circles juft touch thefe continuations
And each fide: the radii are given below * :
The content of the pond, pleafe artifts to fhew.

* The radius of a circle that will touch the leaft fide of the pond, and the continuations of the other fides, was 2 chains; the radius of that touching the fecond fide, and ditto, 3 chains; and the 3d ditto, 6 chains.

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VI. Question (50), *by Mr. Rich. Elliott, Liverpool.*

Required the points of division on the beam of a steel-yard, where the weights of 1, 2, 3, 4, &c lb, on one side, will just balance a constant weight of 90 lb at the distance of 2 inches on the other side of the fulcrum; the weight of the beam being 15 lb, and its whole length 40 inches.

VII. Question (51), *by Mr. Edward Warren.*

Sailing, on June 21, 1793, to the north of the line, but within the tropic, I observed the sun's azimuth at 6 in the morning, by my watch, to be 70°. And 4 hours afterwards I found it to be exactly the same. Required the latitude, and the correct times of the observations, to rectify the watch.

VIII. or Prize Question (52), *by Mr. Ra. Burton, of Salton.* [*Whoever answers it before Candlemas-Day, has a chance by lot for 10 Supplements.*]

Required the quantity, in cubic feet, of light earth, necessary to form a bank on the side of a canal, which will but just support a pressure of water 5 feet deep, and 300 feet long. And what will the carriage of the earth cost, at the rate of 1 shilling per ton: supposing the specific gravities of water and light earth to be such as mentioned in Dr. Hutton's Compend. Measurer.

** The prize of ten Supplements for the solution of the Prize Question has fallen to Mr George Baron ; and the prize of ten Suppl. also, for the solutions of the Enigmas, Rebuses, &c, to Mr. John Rimmer ; who will please to send for them to the Publishers, Messrs. Robinson, Paternoster-row, London.

To persons enquiring for former numbers of the Diaries and Supp. the author answers, that most of the numbers from the beginning can be supplied, and delivered in London, at the rate of 1s. each number.

To Mr. J. K. who puts some queries, the editor returns compliments, and answers, that, for young students, Emerson's smaller book on Mechanics is a good one ; and so is Keil's Introduction to Natural Philosophy, on the Theory, &c. The author (Dr. Hutton) must recommend his own book of Conic Sections, as the easiest and fittest work for the purpose.——Several enquire whether the editor intends to make a 4th vol. of the re-publication of the Diaries since the year 1773, where the former left off. This he may some time do, but not at present, being too much occupied on his great Philosophical and Mathematical Dictionary, now printing, and which it is expected will speedily be published in Numbers or in Parts.

From the late extraordinary increase in the price of paper and printing, this Supplement is unavoidably raised to nine-pence.

F I N I S.